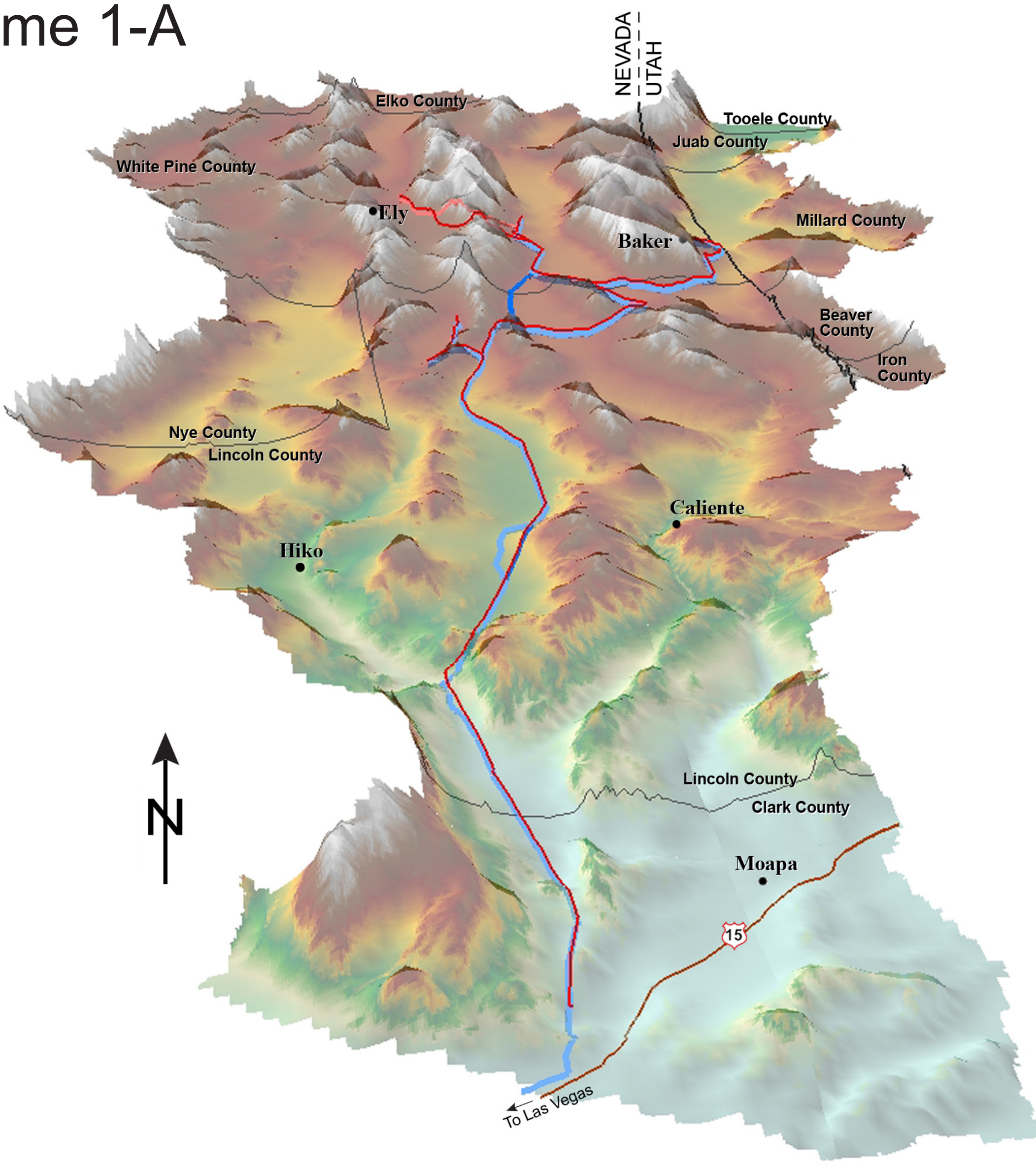
Clark, Lincoln, and White Pine Counties Groundwater Development Project Draft Environmental Impact Statement

Volume 1-A



Bureau of Land Management

June 2011

DES 11-18

Cooperating Agencies:

Army Corps of Engineers
Bureau of Indian Affairs
Bureau of Reclamation
Central Nevada Regional Water Authority
Clark County, NV
Juab County, UT
Lincoln County, NV
Millard County, UT
National Park Service
Nellis Air Force Base
Nevada Department of Wildlife
State of Utah
Tooele County, UT
U.S. Fish and Wildlife Service
U.S. Forest Service
White Pine County

BLM

Nevada Groundwater Projects Office

Mission Statement

The BLM's multiple-use mission is to sustain the health, diversity, and productivity of the public lands for the use and enjoyment of present and future generations.

BLM/NV/NV/ES/11-17+1793

United States Department of the Interior

TAKE PRIDE IN AMERICA

BUREAU OF LAND MANAGEMENT
Nevada State Office
P.O. Box 12000 (1340 Financial Blvd.)
Reno, Nevada 89520-0006
http://www.blm.gov/nv/st/en.html

In Reply Refer to:
2800 (NV910)
N-78803

10 June 2011

Dear Reader:

Enclosed for your review and comment is the Draft Environmental Impact Statement (EIS) for the Clark, Lincoln, and White Pine Counties Groundwater Development Project (also available for review at www.blm.gov/5w5c). The Bureau of Land Management (BLM) has prepared this Draft EIS in response to a right-of-way (ROW) application submitted by the Southern Nevada Water Authority (SNWA) for construction and operation of a pipeline system and associated infrastructure to support the proposed future conveyance of groundwater to Las Vegas Valley from five hydrologic basins in East-central Nevada. Sixteen Cooperating Agencies have assisted the BLM in developing this Draft EIS:

U.S. Forest Service	U.S. Fish and Wildlife Service	Clark County, NV
Nellis Air Force Base	National Park Service	Lincoln County, NV
Army Corps of Engineers	State Of Utah	White Pine County, NV
Bureau of Indian Affairs	Nevada Department of Wildlife	Juab County, UT
Bureau of Reclamation	Central Nevada Regional Water Authority	Millard County, UT
		Tooele County, UT

Some of the above Cooperating Agencies will be using the Draft EIS in their decision-making process for other permits and licenses associated with the proposed project.

This Draft EIS considers the expected environmental effects associated with granting the ROW across public land and subsequent construction and operation of SNWA's proposal. Besides SNWA's proposal, six alternatives including the No Action alternative also are presented and analyzed in the Draft EIS. Specifics of associated future water development currently are unknown and, therefore, are treated in the EIS programmatically and conceptually. As part of the EIS process for this project, a comprehensive groundwater model was prepared. The model report from this effort is included on a separate CD/DVD included with the Draft EIS.

Although water rights, pumping rates, volume of water proposed for transport to the Las Vegas Valley, and the point of use of water proposed for transport across public land is outside the jurisdiction of the BLM, these issues have been included in this document. Water rights and pumping rates are under the purview of the Nevada State Engineer. Water distribution and use associated with the importation of water in the Las Vegas Valley have been addressed by local and regional planning agencies in accordance with Nevada Revised Statutes.

The purpose of this Draft EIS is to document and disclose the expected environmental effects associated with the proposed project and six alternatives. The BLM will use the Draft EIS and public comments to prepare a Final EIS, which will be used to render a decision on whether to grant a ROW. This Draft EIS is not a decision document and, at this time, no agency-preferred alternative has been selected.

The BLM is interested in your review and comments on the accuracy and completeness of this document. The Clark, Lincoln and White Pine Counties Groundwater Development Draft EIS will be available for review for 90 calendar days from the date the U.S. Environmental Protection Agency publishes the Notice of Availability in the *Federal Register*. The BLM intends to hold public meetings in Nevada and Utah during the comment period. The BLM will announce all meeting times and locations at least 15 days in advance through public notices, media releases, or mailings. Information will also be posted online at the BLM website: http://www.blm.gov/5w5c. Comments must include names and mailing addresses; anonymous comments cannot be considered. Send your comments to:

Penny Woods, Project Manager
Bureau of Land Management
Nevada Groundwater Projects Office
Nevada State Office (NV-910-2)
P.O. Box 12000
Reno, NV 89520-0006
FAX: 775.861.6689
Email: nvgwprojects@blm.gov

Please note that public comments and information submitted including names, street addresses, and email addresses of persons who submit comments will be available for public review and disclosure at the above address during regular business hours (8:00 a.m. to 4:00 p.m.), Monday through Friday, except holidays. Before including your address, phone number, email address, or other personal identifying information in your comment, you should be aware that your entire comment – including your personal identifying information – may be made publicly available at any time. While you can ask us in your comment to withhold your personal identifying information from public review, we cannot guarantee that we will be able to do so.

Environmental Impact Statement
For the Clark, Lincoln and White Pine Counties
Groundwater Development Project Right-of-Way

(X) Draft **( ) Final**

Lead Agency: United States Department of the Interior
Bureau of Land Management

Cooperating Agencies: White Pine County, Nevada
Lincoln County, Nevada
Clark County, Nevada
Juab County, Utah
Tooele County, Utah
Millard County, Utah
Central Nevada Regional Water Authority
Nevada Department of Wildlife
State of Utah
United States Air Force - Nellis Air Force Base
United States Army Corps of Engineers
United States Bureau of Indian Affairs
United States Bureau of Reclamation
United States Fish and Wildlife Service
United State Forest Service
National Park Service

Counties Directly Affected: Clark, Lincoln and White Pine Counties, Nevada

Environmental Impact Statement Contact:

Penny Woods, Nevada Groundwater Projects Manager
Bureau of Land Management, Nevada State Office
P.O. Box 12000
Reno NV 89502-0006
775.861.6466

Date Filed with the Environmental Protection Agency: June 3, 2011

The Nevada State Office of the Bureau of Land Management (BLM) has prepared this draft Environmental Impact Statement (EIS) in response to a right-of-way (ROW) application filed by the Southern Nevada Water Authority (SNWA or applicant), a subdivision of the State of Nevada, to construct and operate the Clark, Lincoln, and White Pine Counties Groundwater Development Project (proposed action), a system of groundwater conveyance facilities including main and lateral pipelines, power lines, pumping stations, substation, pressure reduction stations, an underground water reservoir, a water treatment plant and associated ancillary facilities. The project would be located in northern Clark County, Lincoln County, and southeastern White Pine County, primarily within the 2,640-foot wide corridor established by the Lincoln County Conservation, Recreation, and Development Act (LCCRDA) under public law 108-424. Enacted on November 30, 2004, the LCCRDA designated utility corridors to be used for ROWs for roads, wells, pipelines, and other infrastructure needed for construction and operation of water conveyance systems in Lincoln and Clark Counties. The requested ROW extends beyond the northern boundary of the designated corridor into White Pine County in Spring and Snake valleys. For engineering feasibility reasons and/or to minimize environmental impacts, the requested ROW deviates from the corridor in a few locations in Clark and Lincoln Counties. The ROW would be processed in accordance with the Federal Land Policy and Management Act of 1976, which authorizes the Secretary of the Interior to grant ROWs across public lands administered by the BLM. In addition, the Southern Nevada Public Lands Management Act of 1998 also directs the Secretary of the Interior to issue ROWs in Clark County to units of local or regional government for pipelines and systems needed for the impoundment, storage, treatment, transportation, and distribution of water.

This draft EIS considers the expected environmental effects of granting of a ROW across public lands and subsequent construction and operation of the proposed action, no action, and five action alternatives. The BLM will use the EIS when rendering a decision on whether to grant the requested ROW. The BLM action is to either grant or deny the request for ROWs through public land administered by the BLM. This Draft EIS satisfies the requirements of the National Environmental Policy Act, which mandates that federal agencies analyze the environmental consequences of major federal actions.

This draft EIS also includes a programmatic agreement (PA) drafted under the provisions of Section 106 of the National Historic Preservation Act of 1966. The PA would be executed by the BLM, the Advisory Council on Historic Preservation, the Nevada State Historic Preservation Officer, the Army Corps of Engineers and the SNWA to guide roles of the involved agencies and provide procedures on inventorying for historic properties and mitigation of adversely-affected historic properties. The PA is being developed with the involvement of Indian Tribes and other consulting parties as well as the public.

Official responsible for the environmental impact statement:

[signature]	June 3, 2011
Amy Lueders, Acting State Director	Date

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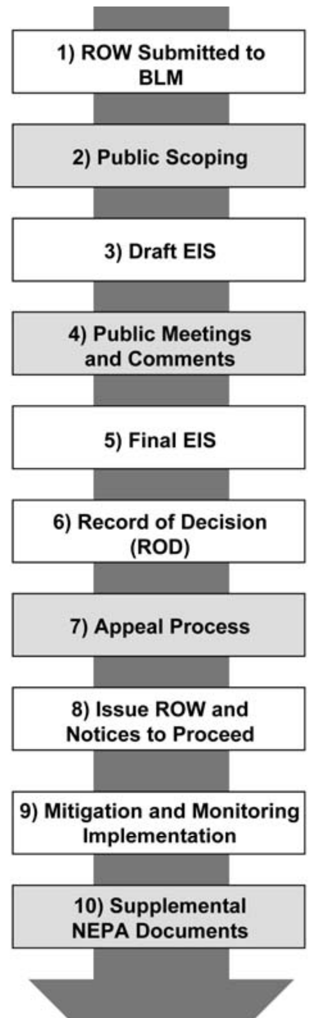
Executive Summary



The U.S. Bureau of Land Management (BLM) received an application from the Southern Nevada Water Authority (SNWA) for a right-of-way (ROW) grant to provide access to public lands for the purpose of constructing and operating pipelines, power lines, and ancillary facilities for groundwater conveyance. These facilities are associated with groundwater rights currently in application status with the Nevada State Engineer. This groundwater (up to 176,655 acre-feet per year) would be withdrawn in central-eastern Nevada and transported via pipeline to the Las Vegas Valley.

The National Environmental Policy Act (NEPA) mandates that every federal agency prepare a detailed study of the effects of “major federal actions significantly affecting the quality of the human environment.” This project is considered a major federal action, and therefore, must undergo the NEPA process; in this case by the preparation of an Environmental Impact Statement (EIS). The NEPA process requires a number of steps including public involvement, an analysis of the affected environment, and BLM disclosure of anticipated impacts from the Proposed Action and reasonable alternatives, including those that the BLM has no authority to mitigate or enforce. Decision-makers must consider environmental effects on social, cultural, economic, natural, and other resources.

The BLM, as the lead federal agency, developed this draft EIS with assistance from 16 cooperating agencies and additional Department of Interior staff. The document has been drafted to comply with applicable laws and regulations, consider the issues raised during the Public Scoping process, provide a reasonable range of alternatives for analysis, and supply a robust analysis to support the Record of Decision that will be issued by the BLM.

The Executive Summary for the Clark, Lincoln, and White Pine counties Groundwater Development Project (GWD Project) is intended to supply information to enable you to provide informed comments to the BLM, or the background to tailor your review of the complete draft EIS to the chapters or sections of particular interest to you. The Executive Summary was written in a “Question and Answer” format that is closely linked to the presentation order of the draft EIS main document.

The information, analysis, and conclusions presented in the draft EIS are subject to public review and comment. Public comment is a vital part of the NEPA process, as it informs the BLM of concerns associated with the project, alternatives, analyses, and other factors associated with the draft EIS. Comments help the decision maker for the proposed federal action make a decision that is consistent with laws and regulations affecting land management and environmental resource protection, as well as public concerns.

Comments can be submitted via email, surface delivery, FAX, at public meetings (oral and written), or other methods that can reasonably be recorded and responded to by the BLM. The review and comment phase is your opportunity to become involved in decision-making and is important to the NEPA process. Comments from the public, local, state, and federal agencies; and Tribal governments provide important information for the analysis process and influence the decisions.

Commenting on the draft EIS is not a "vote" for a specific alternative or on whether the project should be approved. Relevant comments focus on the purpose and need of the proposed action; the proposed alternatives; the assessment of the environmental impacts of the action and alternatives; and the proposed mitigation.

Please consider the following when preparing your comments:

- First review the Executive Summary, then the table of contents. This will help you focus your review on particular topics of interest. For example, if you are concerned about groundwater pumping effects, it may be helpful to first review the Water Resources section.
- Be as succinct as possible.
- Organize comments beginning with general or reference comments and then move on to specific document sections including page numbers.
- Please be specific. Comments supported by logic and rationale are more useful than opinions.
- Please state suggestions and recommendations clearly with an expectation of what you would like the agency to do.
- To the extent possible, make specific, solution-oriented recommendations for environmental mitigation.
- If you comment on project alternatives, please tell us what you believe the trade-offs and differences are between alternatives.
- If you provide alternate interpretations of science, please support your analysis with appropriate references.
- If possible, please coordinate your comments with other like-minded individuals and organizations. This can strengthen the comment and help us understand the depth of concern.
- The law doesn't allow the BLM to make decisions based on the popularity of proposed projects, but it does allow the agency to take steps to protect the environment.

Written comments on the Draft EIS can be submitted to:

The Bureau of Land Management
Groundwater Projects Office
P.O. Box 12000
Reno, NV 89520-0006

Consult the BLM's project website (www.blm.gov/5w5c) for the schedule and locations of Public Meetings on the Draft EIS.

Additional resources are available to help prepare productive comments. We recommend *A Citizen's Guide to the NEPA: Having Your Voice Heard* by the Council on Environmental Quality. This document is available on our website and provides an overview of the NEPA process, explains how agencies use and process comments, and makes suggestions on providing comments that better influence decisions.

The comment period currently is scheduled to close on September 9, 2011. If there are any changes to this schedule, details will be published on the BLM Groundwater Projects website (www.blm.gov/5w5c).

1. What does the Executive Summary contain?

The Executive Summary provides an overview of the draft EIS prepared by the BLM for the SNWA proposed groundwater project in Clark, Lincoln, and White Pine counties, Nevada. The report generally follows the order of presentation found in the draft EIS (**Figure ES-1**), beginning with essential background information about the NEPA process, continuing with a description of project facilities and the draft EIS alternatives, and concluding with summaries of project environmental impacts. **Figure ES-2** provides an overview of the project area and proposed facilities.

A 'Q&A' style presentation is used in the Executive Summary to address the important questions surrounding this project. An electronic version of the full draft EIS, including all graphics, is contained on the CD enclosed with the printed Executive Summary. Also included, is a CD of the groundwater model report prepared for this EIS anlaysis. The complete draft EIS can also be accessed on the BLM's website at:

http://www.blm.gov/5w5c

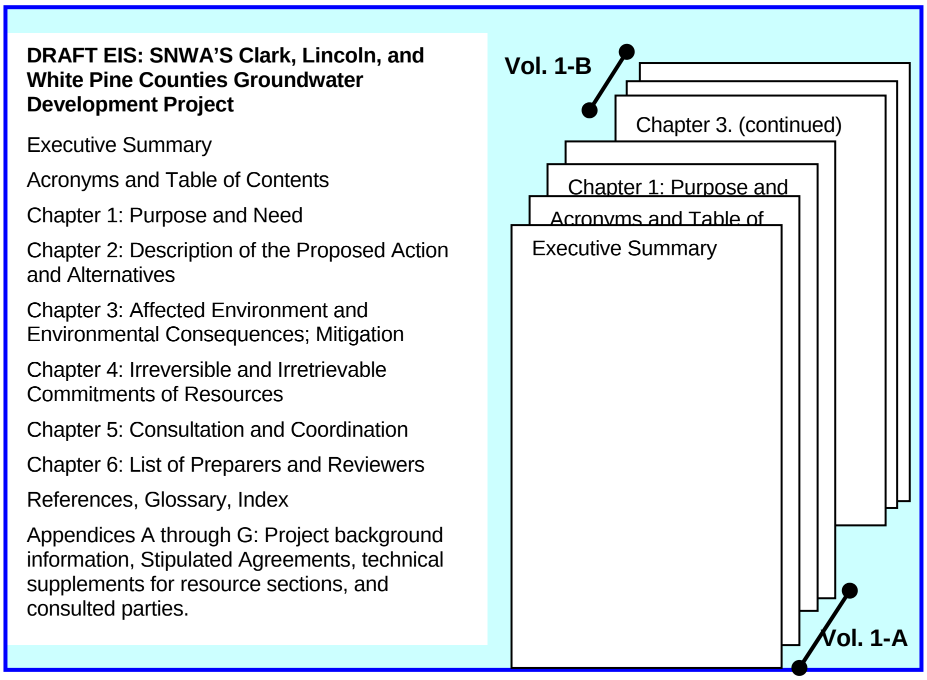


Figure ES-1 Organizational Overview of the Draft EIS

For mail recipients, you have received the Executive Summary in two formats. The first format is the printed document which includes a CD/DVD disk. The Executive Summary also is available in electronic format on the draft EIS CD/DVD disk. When you open the electronic version of the draft EIS, the first section is the Executive Summary. You will be able to link to, and open pertinent sections of the draft EIS by clicking on the green boxes (see example) as you read through the Executive Summary.

Appendix A

Additional information is available from the BLM Groundwater Projects Website:
http://www.blm.gov/5w5c

ACRONYMS

Afy	Acre-feet per year
BLM	Bureau of Land Management
EIS	Environmental Impact Statement
FLPMA	Federal Land Policy and Management Act of 1976
GWD	Groundwater Development (as in reference to this project)
NEPA	National Environmental Policy Act
NSE	Office of the Nevada State Engineer
SNWA	The Southern Nevada Water Authority (the applicant for this project)
ROW	Right-of-way

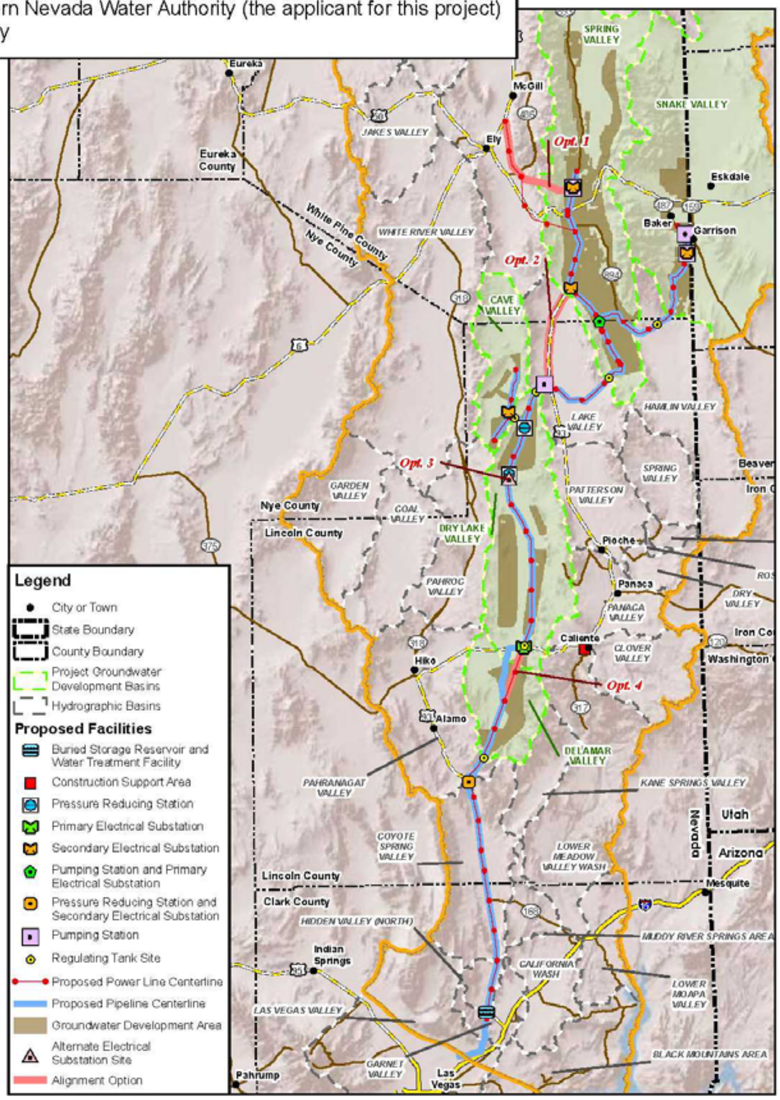


Figure ES-2 SNWA Proposed Groundwater Development Main Right-of-way and Future Groundwater Development Basins

2. Why is this draft EIS being prepared?

On August 19, 2004, the BLM received a ROW application from SNWA to support construction and operation of a buried pipeline system to convey groundwater from central-eastern Nevada to the Las Vegas Valley (**Figure ES-2**). The requested ROWs would be located in Clark, Lincoln, and White Pine counties.

The SNWA proposes to construct and operate main and lateral pipelines, power lines and ancillary facilities. This environmental study addresses impacts of ROW construction and pipeline operation and the potential impacts of drawdown from pumping groundwater on environmental resources. Additional environmental studies will be required before specific, local well fields can be defined and evaluated. Groundwater pumping is not the BLM's decision to make but will depend on the decision of the Nevada Division of Water Resources (Office of the Nevada State Engineer [NSE]) granting water rights in response to SNWA applications.

The GWD Project would provide the infrastructure to convey groundwater from rights that exist or have been applied-for in Spring, Snake, Cave, Dry Lake, and Delamar valleys for use in Clark County. The SNWA has applied to the NSE for water rights, with the quantity and conditions of production subject to approval. The GWD Project is one component of the SNWA long-term water resource plan, prepared pursuant to Nevada law (NRS § 704.661), to meet future demand.

State Water Rights Hearings

The Office of the NSE has scheduled hearings on SNWA's applications for water rights in the Spring, Delamar, Dry Lake, and Cave Valley basins in September, October, and November of 2011. Hearings for the Snake Valley are not presently scheduled. Those five basins are the primary source of groundwater that would be conveyed by the pipeline.

2.1 Who is responsible for preparing this draft EIS?

The BLM is the lead federal agency for the EIS process in compliance with NEPA and the Council on Environmental Quality regulations implementing NEPA (40 CFR 1500-1508). This draft EIS conforms with policy guidance provided in BLM Handbook H-1790-1 and with land management plans currently in place for the affected lands.

As provided for by the NEPA, 16 agencies with jurisdiction by law or special expertise elected to sign a Memorandum of Understanding with the BLM to assist in the EIS process as a cooperating agency. A list of the 16 cooperating agencies follows.

Cooperating Agencies for the SNWA Groundwater Project EIS

Army Corps of Engineers • Bureau of Indian Affairs • Bureau of Reclamation
Central Nevada Regional Water Authority • Clark County, NV • Juab County, UT • Lincoln County, NV
Millard County, UT • National Park Service • Nellis Air Force Base • Nevada Department of Wildlife
State of Utah • Tooele County, UT • U.S. Fish and Wildlife Service • U.S. Forest Service • White Pine County, NV

2.2 What is the purpose of this draft EIS?

The BLM purpose for this action is to grant ROW access across public lands. This draft EIS will analyze impacts of providing the applicant access to and across federal land managed by the BLM for construction and operation of the proposed groundwater conveyance system.

The Federal Land Policy and Management Act of 1976 gives the Secretary of the Interior general authority to grant ROWs across public lands administered by BLM, including ROWs for facilities and systems for the storage, transportation and distribution of water.

The BLM need for a federal action arises from its multiple-use mission which includes managing activities on federal land such as ROW authorizations, while conserving natural, historical, cultural, and other resources on the public lands. The BLM is required by the Federal Land Policy and Management Act of 1976 (FLPMA) and other legislation to consider and respond to the applicant's ROW requests.

Future groundwater development and production in Spring, Snake, Cave, Dry Lake, and Delamar valleys is contingent upon approvals of water rights applications filed by the SNWA with the NSE and associated future ROW grants from the BLM, neither of which are part of this Proposed Action.

2.3 What decisions does the BLM need to make?

The draft EIS assesses the short and long-term effects of construction and operation of the main water conveyance, water treatment and storage facilities, and the power transmission line and other facilities associated with system operations. Construction of these facilities would occur within temporary and permanent ROW grants issued by the BLM.

BLM DECISIONS TIED TO THE NEPA ANALYSIS IN THIS EIS

Approve or deny ROW Grants for the GWD Project (*Main pipeline, transmission line, water storage and treatment facilities, and associated ancillary facilities).*

Develop appropriate mitigation measures to address potential adverse impacts of the GWD Project.

The analysis in the draft EIS will inform the BLM and other governing agencies as they address decisions to:

1) Approve, modify, or deny the ROWs proposed by the SNWA;
2) Apply appropriate mitigation measures; and
3) Develop and implement monitoring plans that ensure compliance with decisions, assess the effectiveness or success of decisions, and determine how to modify decisions if the purpose and need or desired outcomes are not being achieved.

Federal law requires the Secretary to grant the ROWs requested by the SNWA in Clark and Lincoln counties in accordance with the FLPMA and other applicable regulations, subject to NEPA review.

Federal law also requires an agreement between Utah and Nevada on the division of water resources from those interstate groundwater flow systems from which water would be diverted, prior to any transbasin diversion.

In White Pine County, the BLM may grant the ROWs under its own FLPMA general authority.

If ROW grants are approved, the Record of Decision document would contain the requirement for the applicant to prepare detailed, site-specific construction and operation plans for each project phase or facility component. The plans must contain sufficient information for the BLM and other agencies to adequately evaluate specific construction activities and planned application of mitigation. These plans require BLM approval prior to surface disturbance.

2.4 Under what laws is the BLM acting?

The ROWs requested by the SNWA for this groundwater development project must be processed in accordance with the FLPMA, and other laws, as well as the BLM ROW regulations. In addition, Congress has specifically directed the BLM to grant ROWs to the SNWA for water resource development and conveyance projects in Lincoln and Clark counties pursuant to the Lincoln County Conservation, Recreation and Development Act of 2004. This law requires the

BLM to issue ROW grants on federal lands in Clark and Lincoln counties, Nevada to a unit of local or regional government for facilities and systems needed for the impoundment, storage, treatment, transportation, or distribution of water. Additionally, the Southern Nevada Public Lands Management Act of 1998 requires the BLM to issue ROW to units of local or regional government on federal lands.

In 2004, Congress established "…a 2,640 foot wide corridor for utilities in Lincoln County and Clark County, Nevada…" The law states that BLM will grant to the SNWA and the Lincoln County Water District "…nonexclusive ROW to federal land in Lincoln County and Clark County, Nevada for any roads, wells, … other facilities necessary for the construction and operation of a water conveyance system,… within that corridor." The law also directs the BLM to conduct environmental studies to identify and consider the potential impact to fish and wildlife resources and habitat. The law contains a provision that "*the State of Nevada and the State of Utah reach an agreement regarding the division of water resources from groundwater basins located within both states prior to any trans-basin diversion from within those basins. The agreement should allow for the maximum sustainable beneficial use of the water resources and protect existing water use."* Simply put, federal law mandates the BLM to grant the ROWs requested by the SNWA in Clark and Lincoln counties. The SNWA requested ROWs in White Pine County may be granted pursuant to the BLM's authority under the FLPMA.

2.5 What does "tiering" mean in the National Environmental Policy Act process?

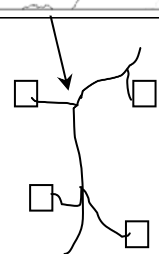
Tiering for NEPA projects first addresses the issues that are developed and ready for analysis, while delaying the treatment of subsequent phases (tiers) until they are ready. For the GWD Project, the BLM will first address the construction and operation of the main and lateral pipeline, pumping stations, regulating tanks, pressure-reducing stations, electrical power lines, electrical substations, electronic system operations facilities, communication facilities, access roads, a water treatment facility, an underground water storage reservoir, and ancillary facilities.

Programmatic Analysis

Programmatic analysis refers to an initial environmental assessment that considers the general characteristics and features of a proposed activity or development, but is not site-specific or tailored to other details about the proposed development.

The SNWA did not apply for ROWs for groundwater production wells and collector pipelines in time to be included in this EIS because certain aspects of that future development are unknown. The environmental effects of that future development, including the long-term effects of groundwater production, are therefore the subject of programmatic analysis that studies the broader area and makes assumptions about where production wells, collector pipelines, and distribution power lines might be located. Programmatic assessments often result in a broad characterization of potential effects over a wide area and/or period of time, with the expectation that the assessment will be refined in subsequent NEPA studies. The analysis also assumes a range of groundwater withdrawal rates and volumes. When applications for additional ROWs are submitted in the future, the environmental effects of those ROWs will be studied using data and results from the first tier, as a starting point for additional analyses. The more detailed assessments are referred to as subsequent or tiered analysis. The tiering process is summarized in **Table ES-1**.

Table ES-1 Overview of Tiered NEPA Analysis

Tier	Study Area	Document	Focus of Document
Tier 1 – Water Resources and Natural Resources Region of Study.		Clark, Lincoln, and White Pine Counties Environmental Impact Statement (EIS).	• Detailed analysis of pipeline and power line infrastructure including construction and operation. • Programmatic analysis of groundwater pumping and conveyance. • Affected Environment described • Cumulative impacts analyzed • Mitigation measures specified or proposed.
Subsequent or tiered Assessments – specific valley or other geographic area.	 Example of a cluster of 4 production wells, roads, power lines and collector lines	Future EAs or EISs.	• This Tier 1 EIS is incorporated by reference. • Analysis focused to specific area, and uses more updated information (if available) • Site-specific geographic setting • Site-specific geographic impacts • Project-specific mitigation measures specified.

In future tiered analyses, more detailed information regarding the location and type of development is used to prepare individual environmental assessments or environmental impact statements focused on a specific valley or other geographic area and the environmental issues associated with that location and development. The hydrologic model used for Tier 1 and baseline characterizations for all resources will be updated in future tiered analyses on site-specific components. The BLM will approve or deny any future proposed ROWs after careful environmental analysis with a decision document issued for each additional request.

2.6 What is the Southern Nevada Water Authority's forecasted water need?

The SNWA is a political subdivision of the State of Nevada that was established in 1991 to address the regional water needs of southern Nevada. The SNWA was formed by agreement among the seven municipal water providers serving the Las Vegas Valley to acquire and manage water resources in southern Nevada, build and manage regional water facilities, and promote responsible water use (SNWA 2009). The SNWA allocates and delivers water to meet the demands of its member agencies. Each member agency is individually responsible for and has sole authority over the allocation and delivery of retail water to customers within its respective service areas, which collectively include the Las Vegas Valley, Boulder City, and Laughlin.

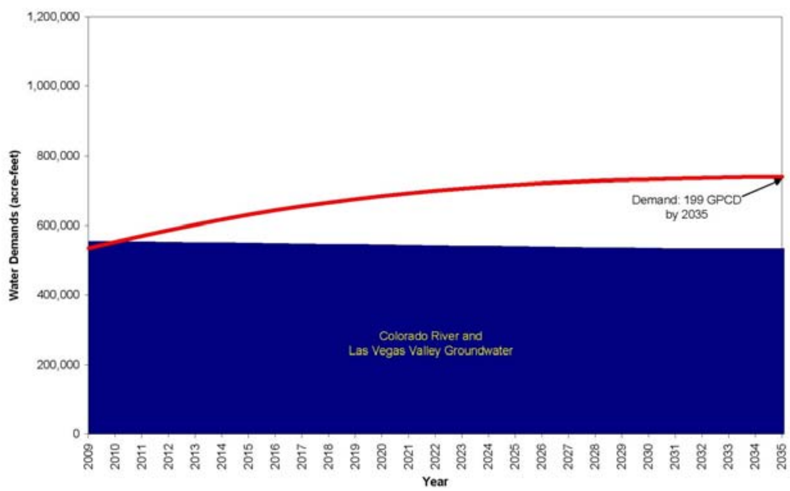
Between 1991 and 2008, conservation efforts in Clark County have reduced average water use by 28 percent, to 248 Gallons per Capita per Day.

In 2009, the SNWA adopted a conservation goal to reduce water use to 199 Gallons per Capita per Day by 2035.

As required by state law, (NRS § 704) the SNWA develops water demand forecasts for its service area over a long-term planning horizon. The SNWA *Water Resource Plan 09* forecasts water demand through 2060. The current water plan is based on economic and demographic forecasts prepared by the University of Nevada Las Vegas.

The SNWA depends on the Colorado River for 90 percent of its current water needs.

The SNWA long-term water demands, including additional conservation goals, are projected to increase over 30 percent between 2010 and 2035, to approximately 739,000 acre feet per year (afy), with additional increases to more than 860,000 afy by 2060 (**Figure ES-3**) (SNWA 2009). Under normal Colorado River conditions, the SNWA anticipated needing groundwater from this proposed project by 2020. Extended drought conditions in the Colorado River Basin would hasten the need for additional water supply.



Appendix A

Figure ES-3 The SNWA Water Demands and Current Resources 2009 through 2035

2.7 What are the Nevada State Engineer's responsibilities?

Nevada's first water statute was enacted in 1866 and has since been amended many times. The NSE is under the Nevada Division of Water Resources. The mission of the Nevada Division of Water Resources is to conserve, protect, manage and enhance the State's water resources for Nevada's citizens through the appropriation and reallocation of the public waters. The NSE is responsible for gathering input and conducting a public process to evaluate the available data and testimony prior to responding to applications for water rights.

Water rights in Nevada are administered by the Nevada State Engineer (NSE) under NRS § 533. The NSE has jurisdiction to grant or deny SNWA's groundwater applications.

Nevada water law is based on two fundamental concepts: prior appropriation and beneficial use. Prior appropriation (also known as "first in time, first in right") allows for the orderly use of the state's water resources by granting priority to senior water rights. Nevada water law has the flexibility to accommodate new and growing uses of water in Nevada while protecting those who have used water in the past.

All water may be appropriated for beneficial use as provided in Nevada law. Irrigation, mining, recreation, commercial/industrial, and municipal uses are examples of beneficial uses, among others.

2.8 What is the Nevada water rights process?

The process to obtain a permit to develop un-appropriated groundwater or surface water begins with filing an application for a water permit with the NSE. In determining whether to grant an application, the NSE must consider if:

1) Unappropriated water exists at the proposed source of supply;
2) The proposed quantity and use of water would conflict with existing rights;
3) The proposed use of water would adversely affect domestic wells; and
4) The proposed use of the water would be detrimental to the public interest.

The NSE has jurisdiction to grant or deny SNWA's groundwater applications in five groundwater development basins. See NRS § 533 for additional factors to be considered prior to approving applications for inter-basin water transfers.

2.9 What is the relationship between the BLM environmental process and Nevada's water rights process?

There are functional interrelationships between the NEPA and NSE processes, in part because decisions and approvals made by one agency may influence the review and approval process of the other agency. The BLM's role as a federal land manager does not include any authority over the SNWA water resources plan, timing or quantity of water required, consideration of alternative sources of water, or priorities in procuring additional sources.

The BLM has no legal authority over water rights in Nevada or the SNWA water resource plan.

Figure ES-4 below illustrates key points and general correspondence between the two processes.

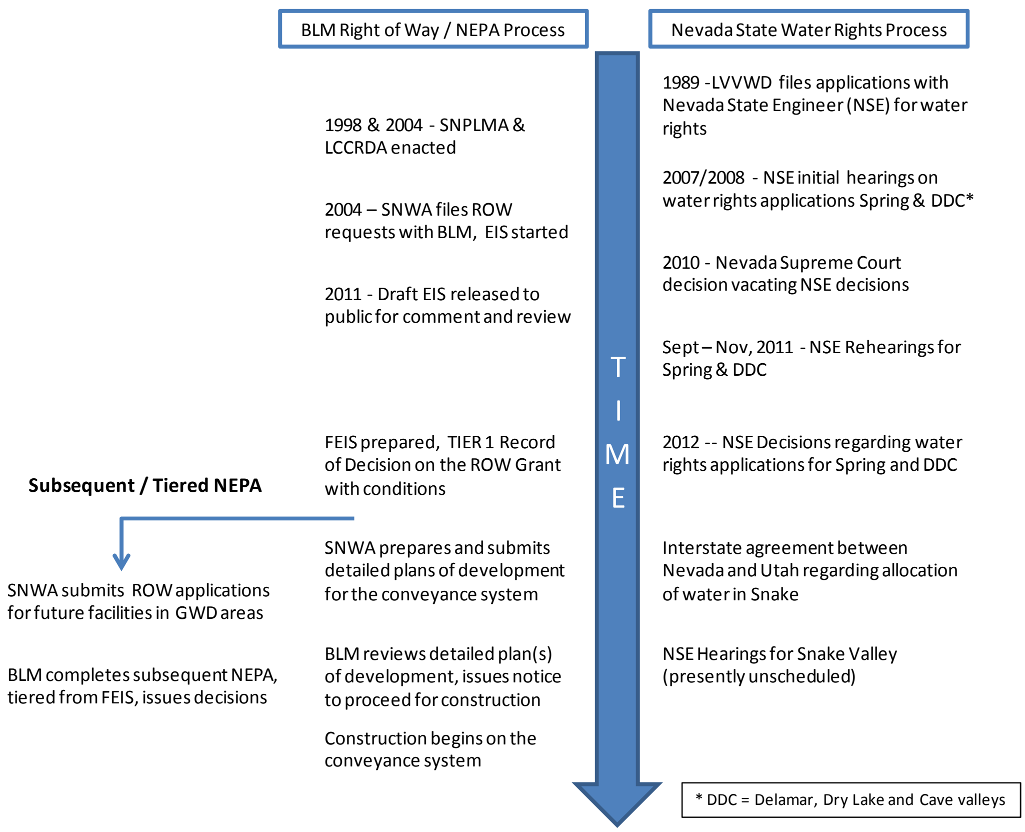


Figure ES-4 General Correspondence of Timing Between the BLM NEPA and the NSE Water Rights Processes

Future development proposed for location on public lands and involving additional federal ROWs for groundwater production wells and collector pipelines would require additional environmental studies for future actions.

2.10 Are other agency approvals and consultation required before the project would move forward?

Yes, a number of other federal and state agency reviews, permits, and consultations would be required in order for the SNWA to move ahead with construction and operation of the GWD Project. Many review processes are concurrent with the EIS process, while construction approvals, wildlife handling permits, and other approvals will follow the BLM's decision on the ROW application.

Section 1.5.5

2.11 How were draft EIS environmental issues developed and what are they?

The BLM has received much formal and informal public comment (e.g., public scoping meetings; phone calls, emails, letters to the BLM project management; and newspaper articles and editorials) and worked closely with cooperating agencies, Department of Interior staff, tribal groups, and other interested parties. The public is an important element of the NEPA process and their comments have shaped the issues and analysis in the draft EIS. Following public scoping for the GWD Project, the comments were compiled, grouped by resource areas, and decisions were made on which issues would be addressed in the draft EIS. The critical issues fall into nine broad categories:

- Water Resources
- Data Gaps
- Project Description
- NEPA Process
- Environmental Issues
- Land Use
- Fish and Wildlife
- Alternatives
- Socioeconomics

A full scoping report, summarizing public input, is available on the BLM's groundwater project website: www.blm.gov/5w5c.

2.12 How have Native Americans been engaged in the NEPA process?

In 2007, the BLM initiated government-to-government consultation under section 106 of the National Historic Preservation Act with 28 Indian tribes and bands that may have religious or cultural ties to the project area. Based on feedback from the initial round of Tribal contacts, six more tribes were contacted in 2009. Since that time, based on initial contacts and other information, tribal consultation has been conducted with 25 tribes and bands with specific religious and cultural ties to the area.

As part of the NEPA process for the EIS, the BLM conducted a regional ethnographic study. Seventy-seven tribally sensitive sites were identified as part of that ethnographic study. Those sites are currently being reviewed by the BLM's Ely and Southern Nevada Districts for further study and possible inclusion into the National Register of Historic Places.

In addition to government-to-government consultation with individual tribes, the BLM has sponsored pan-tribal information sessions on the project, the ethnographic assessment and the programmatic agreement was drafted to address on-going cultural survey issues throughout the life of the project (if it is approved). At tribal request, the BLM hosted a NEPA workshop for tribal members specific to the GWD Project.

As part of this EIS, the BLM prepared a draft Programmatic Agreement and requested that it be reviewed during the comment period for the EIS. This draft agreement explains the proposed GWD Project and describes each agency's role in complying with Section 106. This draft also describes the area of potential effect; outlines the processes and methods the BLM plans to use when inventorying historic properties; the consultation process to be used during the inventories; determining eligibility for inclusion on the National Register of Historic Places; and mitigating adversely-affected resources identified along the ROW of the proposed pipeline. The agreement also defines procedures addressing discoveries of human remains or historic properties during project construction, should the ROW be granted.

2.13 What are the controversies associated with this Project?

The BLM recognizes that there are differing opinions among experts and other people on a variety of issues regarding SNWA's GWD Project. Conflicting ideas and areas of controversy related to this project include:

- Potential climate change effects on long-term water needs and availability;
- Water need and availability and the equity of water transfers;
- Groundwater modeling and results, including use of faults as barriers to flow;
- The timing and significance of possible future impacts in Snake Valley and vicinity of Great Basin National Park;
- The relationship of groundwater to economic and population growth in the Las Vegas Valley.

While recognizing these controversies, it should be noted that many aspects of these issues are outside the jurisdiction of the BLM.

2.14 What are the draft EIS alternatives, and how did the BLM identify them?

The impacts of a full range of reasonable alternatives must be assessed to compare the effects of the Proposed Action and other alternatives, including No Action. The analysis considers both ROW alignment and pumping alternatives. The BLM is considering how best to grant the requested ROWs, while protecting natural and cultural resources located on public lands.

2.14.1 Main Project Right-of-way Alignments

The draft EIS assesses three ROW alignments. Each alignment is paired with one or more groundwater development alternatives (see Section 2.14.2 in the draft EIS).

1) The SNWA's full ROW request for the main pipeline, two major lateral pipelines, power lines, and other ancillary facilities (supports groundwater development for the Proposed Action and Alternatives A through C);
2) A ROW mandated by Congress (Lincoln County Conservation, Recreation, and Development Act) in Lincoln and Clark County only (supports groundwater development for Alternative D); and
3) A ROW mandated by Congress, with an extension into Spring Valley in White Pine County defined as the Spring, Delamar, Dry Lake and Cave valleys alignment (supports groundwater development for Alternative E).

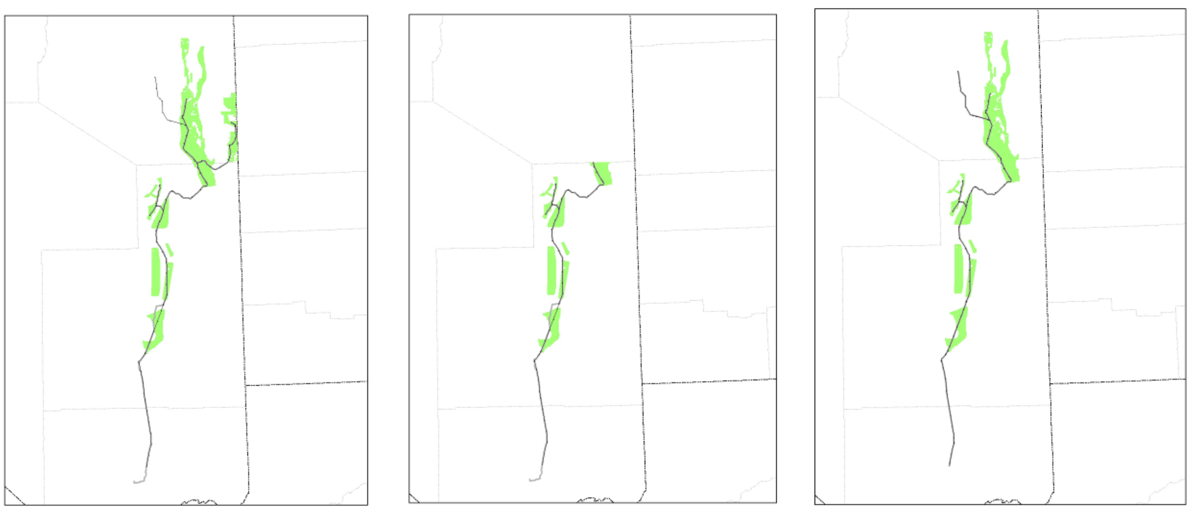
The SNWA ROW request for the main pipeline extends from Clark County (common to all three alignments, to a point in northern Lincoln County near its boundary with White Pine County (common to all three alignments), with two major laterals into White Pine County; one extending northward into the Spring Valley, the other extending eastward into the Snake Valley.

Each ROW alignment provides for temporary and permanent ROWs to support construction of a pipeline and ancillary facilities. **Table ES-2** and **Figure ES-5** show these three main pipeline ROW alternatives.

Table ES-2 Summary of the Three Main Pipeline ROW Alignments Analyzed in Tier 1

Primary ROW Alignment	Counties Where Major Conveyance System ROWs Could be Granted				Miles of Main Pipeline ROW
	Clark	Lincoln	White Pine (Spring Valley)	White Pine (Snake Valley)	
SNWA Full ROW Request	Yes	Yes	Yes	Yes	306
Lincoln County Conservation, Recreation, and Development Act	Yes	Yes	No	No	225
Spring, Cave, Delamar, and Dry Lake valleys	Yes	Yes	Yes	No	263

[1] Congressionally directed by the Lincoln County Conservation, Recreation and Development Act of 2004.



Full ROW Request **LCCRDA** **Spring / DDC**

Figure ES-5 Groundwater Development Project Main Right-of-way Alignments

The second ROW alignment reflects the congressional direction provided in the Lincoln County Conservation, Recreation, and Development Act, following the same alignment through Clark and Lincoln counties, ending at the common point near the Lincoln and White Pine county boundary.

The third ROW alignment includes the Lincoln County Conservation, Recreation, and Development Act corridor ROW, adding the Spring Valley lateral into southern White Pine County. The third ROW alignment can also be viewed as the SNWA ROW request, minus the Snake Valley lateral.

The differences in the northern terminus among the three alignments result in different ROW lengths and the amount of surface disturbance. SNWA's full ROW request is the largest, involving 306 miles of ROW for the pipeline and 12,303 acres of temporary disturbance, while the Lincoln County Conservation, Recreation, and Development Act alignment has the smallest numbers, 225 miles of pipeline ROW and 8,843 acres of temporary disturbance. **Table ES-3** summarizes the facilities and disturbance estimates for the three conveyance system ROW alignments and associated ancillary facilities.

Table ES-3 Facilities and Estimated Disturbance for the Three main ROW Alignments

Component	Full ROW Request	Lincoln County Conservation, Recreation, and Development Act	Spring, Cave, Delamar, and Dry Lake Valleys
Pipeline (miles)	306	225	263
Electric Power Lines (miles)	323	208	280
Electrical Substations (number)	7	4	6
Pumping Stations (number)	5	2	3
Regulating Tanks (number)	6	5	5
Pressure-reducing Stations (number)	3	3	3
Water Treatment Facility/Buried Storage Reservoir (number, location)	1 (Garnet Valley)	1 (Garnet Valley)	1 (Garnet Valley)
Access Roads (total miles)	431	315	388
Power Requirements (megawatts)	74	54	55
Estimated Construction Surface Disturbance	12,303	8,843	10,696
Temporary Disturbance Area to be Revegetated	11,289	8,020	9,736
Permanent Disturbance	1,014	823	960

Most of the surface area disturbed during construction would be revegetated in accordance with BLM's best management practices. The estimated net long-term disturbance is 1,014 acres under the SNWA full ROW request, while 823 acres would be disturbed with the Lincoln County Conservation, Recreation, and Development Act-mandated alignment and 960 acres of disturbance for the Spring, Cave, Delamar, and Dry Lake valleys alternative alignment.

2.14.2 Alternatives for Analysis

Seven alternatives are defined for the programmatic aspect of this draft EIS; six action alternatives and the No Action. Each groundwater development action alternative is defined by one of the three major ROW alignments, an assumed level of SNWA groundwater production, an assumed well development pattern, and whether production would occur full time or on an intermittent basis. Three levels of annual production were defined for the analysis:

Although the BLM is mandated by law to grant certain ROWs, the No Action Alternative is used as a benchmark for the comparison of the Proposed Action and alternatives.

- NSE approval of all rights at the SNWA "applied for" volumes: up to 176,655 afy;
- NSE Approval of lesser quantities: up to 114,655 afy; and
- NSE Approval of lesser quantities: up to 78,755 afy, assuming no groundwater development in Snake Valley.
- The groundwater production assumptions reflect potential future NSE rulings on the SNWA pending water rights applications, options regarding well placement, and assumed frequency and duration of groundwater production.

The ROW alignments relate to the current federal action and would result in a ROD that approves, modifies, or denies the ROW; the other factors relate to the programmatic analysis of future groundwater development. **Table ES-4** summarizes the seven alternatives for analysis. The Proposed Action and Alternatives A, B and C all use the full project footprint contained in the SNWA ROW application.

Table ES-4 Summary of the Seven Alternatives for EIS Analysis

Seven Alternatives for Analysis	Conveyance System Alignment	SNWA Groundwater Production	Basins in Which SNWA Production Would Occur	Well Placement[3]	Full Build out
Proposed Action	Full ROW request [1]	Up to 176,655 afy	Spring, Snake, Cave, Delamar, Dry Lake	Distributed	2050
A	Full ROW request [1]	Up to 114,755 afy	Spring, Snake, Cave, Delamar, Dry Lake	Distributed	2050
B	Full ROW request [1]	Up to 176,655 afy	Spring, Snake, Cave, Delamar, Dry Lake	Points of Diversion	2050
C	Full ROW request [1]	12,000 to 114,755 afy (varies in response to drought)[2]	Spring, Snake, Cave, Delamar, Dry Lake	Distributed	2050
D	LCCRDA	Up to 78,755 afy	South Spring, Cave, Delamar, Dry Lake	Distributed	2043
E	Spring / DDC	Up to 78,755 afy	Spring, Cave, Dry Lake, Delamar (No Snake)	Distributed	2049
No Action	None	None	None	None	NA

[1] Full ROW request includes the ROW for the main pipeline, two main lateral pipelines, transmission line, and other ancillary facilities

[2] Includes 3,000 afy of water rights transferred by the SNWA to the Lincoln County Water District.

[3] "Points of diversion" refers to siting wells at specific locations identified and approved by the NSE. "Distributed" refers to siting wells based on the results of monitoring, productivity, and hydrologic modeling to reduce long-term adverse environmental effects.

2.14.3 Were Alternatives considered but not carried forward for detailed analysis, and if so, what are they?

The BLM also is required to explore and evaluate reasonable alternatives to the Proposed Action, and to briefly discuss the reasons for eliminating potential alternatives from detailed study (40 CFR § 1502.14[a]). The BLM NEPA Handbook, H 1790-1, V-5 (BLM 2008), provides that, except for the No Action Alternative, alternatives selected for the EIS should "respond to the purpose and need for the action." Project alternatives are potential substitutes for the Proposed Action (a ROW grant in this case) and may accomplish the general goal of the federal action in another manner.

Section 2.7

As noted earlier, the purpose of the federal action described in this draft EIS is to respond to SNWA's request for a ROW across federal land managed by the BLM. This ROW would be designated for construction and operation of a groundwater conveyance system that would allow the SNWA to access groundwater rights appropriated by the Nevada State Engineer in Lincoln and White Pine counties. Water would be piped to interconnections with municipal systems in Lincoln County and the Las Vegas Valley. The need for the federal action arises from the BLM's responsibilities to process ROW applications in response to Congressional direction, and to follow FLPMA requirements. Possible alternatives were screened against this purpose and need criterion.

The BLM examined the feasibility of transporting groundwater from the designated groundwater development areas to Lincoln County and the Las Vegas Valley via trucks, trains, and aqueducts, and implementing different configurations of the proposed conveyance system. None of these alternatives would result in a reduction in environmental impacts, or be more economical than the Proposed Action. For example, more than 8 million tanker-truck loads per year would be needed to transport the volume of water associated with the Proposed Action. Trucking would pose a higher safety risk to the public than a pipeline system and would consume large quantities of petroleum-based fuels resulting in substantial effects to air quality. Operational costs also would be very high. In addition, two different configurations of the proposed conveyance system were also considered: phased development of the GWD Project and development of a parallel system to allow return of some groundwater to the hydrographic basin of origin. Both of these alternatives were eliminated due to greater adverse environmental effects and financial costs.

Water supply and management alternatives (e.g., desalination and weather modification via cloud seeding) different in type and location from the SNWA's proposal were suggested during public scoping. None of these water supply alternatives would fulfill the purpose and need for the federal action or provide a comparable volume of water, within a similar time frame, and under financially feasible terms. As a result, no water supply and management alternatives were determined to be reasonable alternatives to a ROW grant for this draft EIS.

3. Environmental Consequences – Tier 1 Facilities

3.1 What project facilities and effects does this EIS address?

The SNWA current ROW request covers only the main pipeline, power line, and primary lateral facilities. The draft EIS includes both the site-specific analysis for the mainline and primary lateral facilities and programmatic analysis for future facilities. Details regarding future facilities for groundwater development, including the number and location of wells, are presently unknown. Thus, the environmental effects of that future development, including the long-term effects of groundwater production, are the subject of programmatic analysis (see Sections 4 and 5 of this Executive Summary).

3.2 How would the Project be constructed?

Standard pipeline, power line, and facility construction techniques would be used. Detailed descriptions of construction methods and procedures, including manpower and equipment estimates, are provided in **Appendix E** of the draft EIS.

Appendix E
SNWA's POD

The ROW boundaries would first be surveyed and staked, including the use of staking and temporary fencing for avoidance areas Plant and topsoil salvage would occur and the ROW cleared. Access roads within the ROW would be constructed or improved at the beginning of construction. Portable sanitation and water storage facilities would be provided for construction personnel.

The SNWA Proposed Action calls for a pipeline of up to 96" in diameter. The pipeline could be resized during final design. For this analysis, it is assumed that neither the alignment, ROW width for the conveyance system, nor amount of disturbance would be affected by the size of the main pipeline.

Pipeline construction would use a standard cut and cover technique, with an open trench, in most locations. **Figure ES-6** below depicts a general layout of facilities and cut-and-cover construction within the ROW. Pipe sections would be placed and welded, and the trench backfilled and compacted. Blasting might be necessary if caliche (consolidated calcium carbonate layer) or large boulders are encountered during excavation. At stream crossings with flowing water, construction would either involve jack-and-bore under the channel or open-cut with temporary diversion of water flow, in accordance with the law.

The regulating tanks and access roads would be constructed in conjunction with the pipelines.

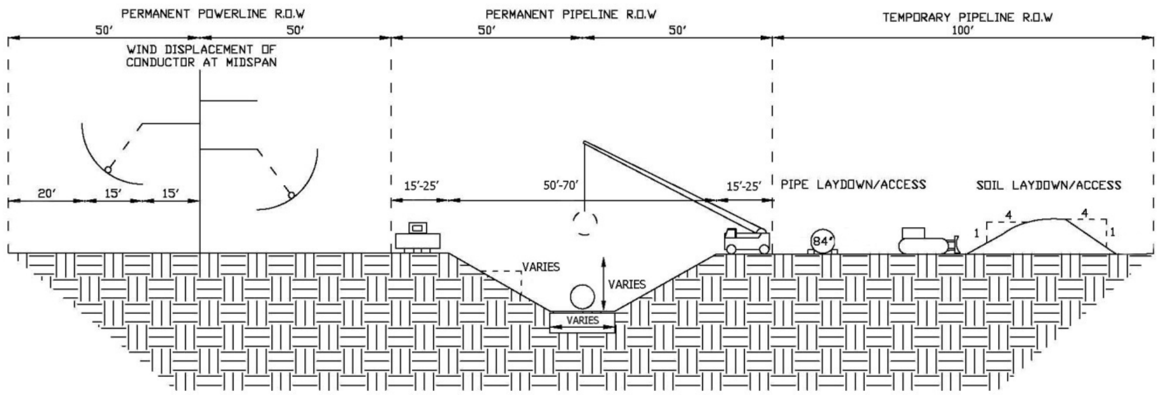


Figure ES-6 Preliminary Pipeline and Power Line ROW Cross Section

Water would be required for dust control, pipe bedding, trench backfill compaction, hydrostatic testing, and other purposes. The SNWA assumes that this water would be obtained from existing or exploratory wells drilled at the time of construction. A construction water supply well would be needed approximately every 10 miles along the pipeline alignment. If needed, additional temporary water wells would be drilled within construction staging areas. Hydrostatic testing would be conducted to pressure-test the pipeline when construction is completed; this testing might be done as individual segments are completed.

Figure ES-7 illustrates typical power line configurations. Power line construction would not require clearing and grading the entire ROW. Work sites of up to 0.5-acre would be cleared for each power pole location and an access road or road spur to the pole location would be rough-graded. A truck-mounted rotary auger would bore the pole locations, and then install the poles on site. Conductor lines would be strung using conventional tensioning equipment. Electrical equipment would be tested and the power lines energized after being connected to substations and facilities.

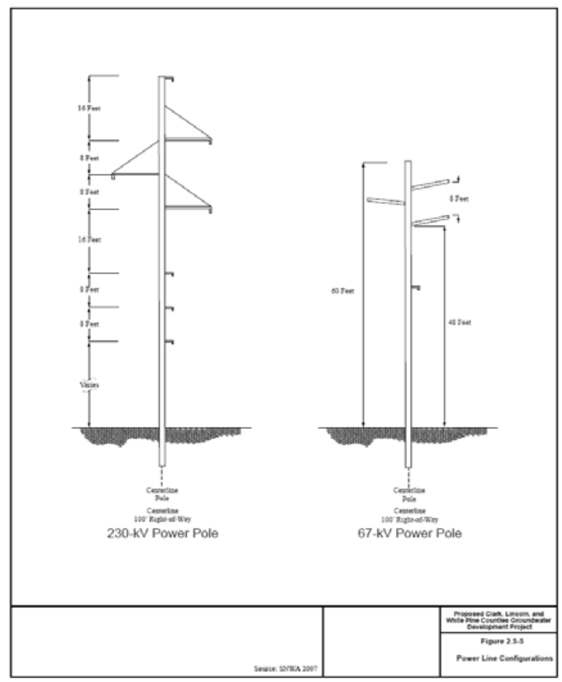


Figure ES-7 Typical Power Pole Designs

Ancillary facility sites would be staked and then plant and topsoil salvage would be conducted and the sites would be fenced, cleared, and graded. Excavation would be conducted as needed, and then the structures would be installed on site.

Following the completion of construction, the temporary ROWs would be reclaimed.

The service life of water pipelines is estimated at 65 to 95 years. Future replacement of substantial portions of the pipeline would require additional approvals from the BLM and may be subject to additional NEPA. Future reclamation and abandonment of the ROW would be subject to approval by the BLM.

3.3 What is the current schedule for Project construction?

The current project schedule assumes that right-of-way grants and permits, and ruling by the NSE on SNWA's water applications by the NSE could occur by early 2012. Groundwater conveyance from Delamar Valley could begin by 2020. The anticipated construction schedule is provided in **Figure ES-8**. Construction would likely be year-round, although seasonal wildlife stipulations may delay activity in specific locations during certain periods.

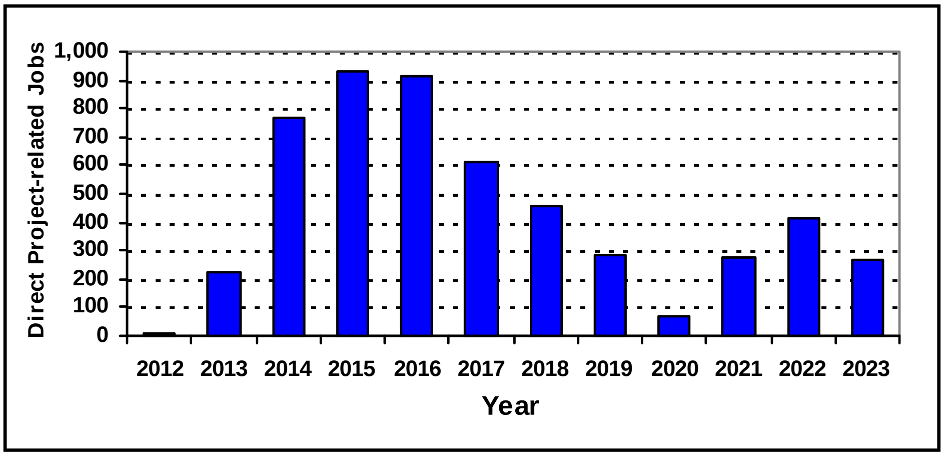


Figure ES-8 Projected Direct Construction Workforce – Proposed Action

Construction of the project would begin at the southern terminus, where the pipeline would connect to the SNWA's existing system, proceeding generally northward into Lincoln County. Construction of the main pipeline and transmission facilities to the juncture for the Spring and Snake Valley laterals by 2019. An additional 2 years would then be required to complete the Spring Valley lateral and pump stations, followed by completion of the Snake Valley lateral and pump stations in 2023. The water treatment facility and buried water storage reservoir would be completed within the first four to five years. Conveyance of water through the system is not contingent upon completion of the entire system, but could begin following completion of system and associated groundwater production facilities in the Delamar, Dry Lake, and Cave valleys.

Construction employment would increase over the first 3 years, peaking in 2015, when construction of the pipeline, water treatment, storage, and other facilities in Clark County would occur concurrently (**Figure ES-8**). Construction employment would decline thereafter, but would then increase in conjunction with completion of the Snake Valley lateral in 2023.

Construction of the conveyance system associated with Alternatives D and E could be accomplished sooner. If drought conditions improve, relieving stress on the SNWA water supplies on the Colorado River, construction could be deferred for several years.

3.4 What methods were used to assess potential environmental effects?

Environmental effects for construction and operation of the pipeline and other facilities were based on an understanding of the location, extent, and timing of development.

The first step in assessing the potential environmental impacts was to define the geographic area that is likely to be affected and to understand the current environmental and socioeconomic conditions within that area. For the GWD Project, this study area includes the ROW corridors and nearby areas because some potential effects may extend beyond the immediate facility construction area.

The ROW corridors and facility locations proposed by the SNWA were mapped using information contained in geographic information systems and other data sources. This information yielded estimates of the extent and location of temporary and long-term surface disturbance. These maps were then used to focus the collection, compilation and analysis of data for other resources that may be affected by the project.

Methods and assumptions for impact analysis were developed for each resource. Impacts to resources were then quantified and interpreted in terms of duration, context, and intensity (BLM NEPA Handbook, 2008). The estimated impact levels were reduced through application of the BLM Best Management Practices and Applicant Committed Environmental Protection Measures. Additional mitigation measures were developed and applied to certain impact issues (See Section 3.5 below).

Conclusions concerning residual impacts after application of protection measures and mitigation measures were prepared. Quantified impact results were displayed in figures and tables to allow a comparison of alternatives. Impact summaries are included at the end of the draft EIS, Chapter 2.

3.5 How does the EIS address mitigation of potential short and long-term environmental effects?

The anticipated effects from project construction and maintenance on a particular resource were then evaluated to determine how effects could be avoided or reduced through the application of impact control and mitigation measures. Four levels of protection or mitigation were considered; the BLM management direction established in management documents, best management practices, applicant committed protection measures, and additional mitigation.

BLM Best Management Practices

BMPs *are state-of-the-art mitigation measures applied to help ensure that facility development is conducted in an environmentally responsible manner. BMPs protect wildlife, air quality, and landscapes as we work to develop vitally needed minerals, energy, water, and other resources.*

53 specific BMPs have been identified for implementation as part of the GWD Project (see **Table 2.3-1** of the draft EIS)

Air Resources • Water Resources • Soil Resources • Vegetation Resources • Fish and Wildlife
Special Status Species • Wild Horses • Cultural Resources • Paleontological Resources
Visual Resources • Travel Management and Off-Highway Vehicle Use • Recreation • Livestock Grazing
Fire Management • Noxious and Invasive Weed Management • Health and Safety

The BLM Ely District Resource Management Plant (2008) and the BLM Las Vegas Resource Management Plan (1998) provide management direction for all BLM-managed lands that would be occupied by the GWD Project facilities. The Ely District Resource Management Plan management actions, best management practices, and U.S. Fish and Wildlife Service's Biological Opinion terms and conditions that would apply to the GWD Project were identified. These same measures would be applied in the Southern Nevada District (Las Vegas).

In addition to implementing BLM BMPs, SNWA has agreed to an extensive series of ***applicant-committed environmental protection measures*** in conjunction with the GWD Project. The SNWA's applicant-committed environmental protection measures address construction procedures and operational practices, and identify specific mitigation to address environmental resources. The applicant-committed environmental protection measures include measures to address future development,

APPLICANT-COMMITED ENVIRONMENTAL PROTECTION MEASURES (ACMs)

A. ROW Measures

1. General Construction Measures
2. Operational Practices
3. Geologic Hazards and Soils
4. Water Resources
5. Biological Resources
6. Paleontological
7. Cultural Resources
8. Land Use and Range
9. Noise
10. Air Quality
11. Visual Resources
12. Socioeconomics

B. Programmatic Measures – Future ROWs

1. Planning and Design
2. General Construction Practices
3. General Operation Practices
4. Water Resources
5. Biological Resources

C. Regional Water-Related Effects

D. Measures from SNWA Agreements and NSE Permit Conditions

operations, and regional water-related effects. The resources and topics addressed by one or more applicant-committed environmental protection measures are listed in the adjacent figure.

Two critical measures are included among the applicant-committed environmental protection measures:

- SNWA must complete a detailed construction, operation, and maintenance plan, to be approved by the BLM, for the final project. Multiple plans may be developed if the project is to be completed in phases. The detailed construction, operation and maintenance plan will incorporate all BMP, applicant-committed environmental protection measures, and mitigation contained in the Record of Decision and provide detailed design and construction specifics, including timing and phasing, access roads and ROW entry points, areas to be fenced, and how all of the best management practices, Applicant Committed Environmental Protection Measures, and mitigation will be followed. The BLM must approve the construction, operation and maintenance plan(s) before issuing a notice to proceed for any construction or surface disturbance activity.
- The general extent of regional water-related effects associated with the proposed groundwater withdrawal for the GWD Project is estimated using groundwater modeling. Because the precise nature, extent, timing, and location of water-related effects cannot be determined, SNWA has identified applicant-committed environmental protection measures that may be implemented, as needed, to avoid, minimize or mitigate potential water-related effects associated with future withdrawals. Applicant-committed environmental protection measures include a series of monitoring, management, and mitigation plans, conservation agreements, and adaptive management plans to address adverse effects associated with groundwater production.
- Collectively, the applicant-committed environmental protection measures are designed to reduce, avoid, or offset some of the adverse environmental consequences associated with the construction and operation of this Project. A complete listing of all SNWA applicant-committed environmental protection measures for this project can be found in the draft EIS in **Appendix E**.
- Additional mitigation measures were developed for some resources to further reduce or avoid impacts after the BLM Resource Management Plan management actions, best management practices, and applicant-committed environmental protection measures are fully implemented.

3.6 What are the environmental impacts of implementing the three main pipeline alignments?

The environmental impacts include the effects to natural and human resources from surface disturbance and the human and mechanical activities associated with creating that disturbance, and reclamation. The extent of many of the environmental effects associated with pipeline and associated facilities construction depends on the length and width of the ROW and the temporary disturbance during construction, and later, the permanent disturbance after reclamation. In this case the 3 major ROW alignments are the same from Clark County to a point in Lincoln County. The differences in environmental effects among alignments are related to the Spring and Snake Valley laterals. Right of way requirements for roads and power lines among the three ROW alternatives would also factor into differences in impacts. **Figure ES-9** illustrates the pipeline ROW miles and acres of temporary disturbance for the three main ROW alignments. Approximate differences between the Proposed Action alignment and the alternatives are:

- Alternatives A, B and C are the same as the Proposed Action,
- Alternative D is 29 percent less in terms of acres of temporary disturbance and 35 percent less in terms of the miles of main pipeline ROW, and
- Alternative E is 13 percent less in terms of both temporary disturbance and miles of pipeline ROW.

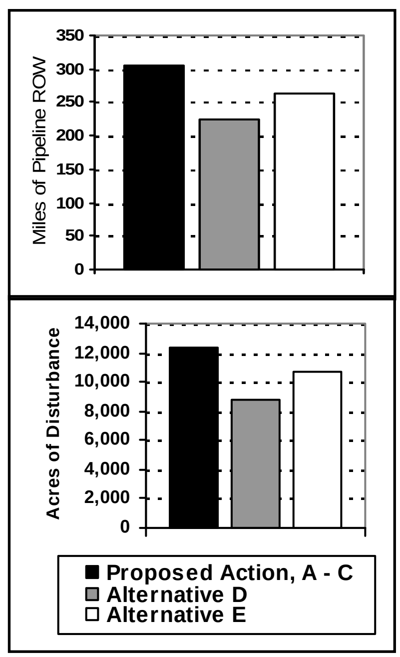


Figure ES-9 Pipeline ROW and Temporary Disturbance

!! There are relatively few major surface disturbance differences among the GWD project alignments because all three main pipeline ROWs would be the same for most of their respective lengths.

The environmental impacts from the Proposed Action main pipeline and associated facilities are summarized below. Generally, impacts would be less and occur over shorter periods of time for Alternatives D and E. There would be few environmental impacts in White Pine County under Alternative D. Under Alternative E, environmental effects would extend into northern Spring Valley, but not into Snake Valley.

The following is a summary of the impacts resulting from the construction and operation of the main pipeline alignments. The primary summary includes the effects for the Proposed Action and Alternatives A through C. Unless differences are identified for Alternatives D and E, the expected effects are similar for all alternatives.

Air Quality and Atmospheric Resources:

- Air pollutant emissions related to construction, disturbance and reclamation associated with activities on approximately 12,303 acres over an 11-year period. Emissions are expected to be less for Alternatives D and E because of smaller surface disturbance areas, and fewer pipeline miles.
- Minor increase in air pollutant emissions, including greenhouse gas emissions, from operation and maintenance activities.

Water Resources:

See Section 3.3

- A temporary channel alteration and potential water quality effects would occur on one perennial stream crossed by the pipeline ROW. There would be no perennial stream crossings by the pipeline ROW under Alternatives D and E.
- Water quality effects may occur on two perennial streams crossed by the power line ROW. No perennial streams would be crossed by the power line ROW under Alternatives D and E.
- There is a potential for channel alteration and water quality effects on numerous intermittent and ephemeral streams by the pipeline and power line ROWs.

Disturbance

Up to 12,303 acres would be temporarily disturbed under the Proposed Action or Alternatives A, B & C.

There would be short-term disturbance of up to 8,843 acres and 10,580 acres for Alternatives D and E, respectively.

Disturbed acres would be reclaimed as soon as construction segments are completed

Permanent disturbance would be less than 1,000 acres under any alternatives.

Soil Resources:

- Short-term disturbance would occur on the following number of acres of sensitive soils: highly wind erodible (1,476), highly water erodible (369), compact prone (123), and vegetation growth limitations (10,580).
- Short-term disturbance of approximately 2,584 acres of land with prime farmland characteristics may occur. Under Alternative D, 2,288 acres of lands with prime farmland characteristics may occur, compared to 2,354 acres under Alternative E.

Vegetation:

- Clearing of approximately 12,303 acres would be required during construction, with 11,303 acres to be reclaimed. Alternative D would require clearing of 8,843 acres during construction with just over 8,000 acres reclaimed. Alternative E would require clearing 10,696 acres during construction with 9,700 acres to be reclaimed.
- Temporary clearing would increase the potential for spread of noxious weeds by construction traffic, particularly in and near cleared areas.

Section 3.5

- Construction activities would result in increased risk of wild land fires.
- The areas of temporary disturbance include some suitable habitat for six BLM sensitive plant species.
- There would be some loss of yucca and cacti during salvage, interim storage, and subsequent replanting.

Wildlife Resources:

See Section 3.6

- ROW vegetation clearing would affect important big game range in the project area. The estimated affected areas include: antelope (7,950 acres), elk (4,019 acres), mule deer (3,918 acres), and desert bighorn sheep (285 acres). The majority of the affected areas would be located in northern portions of the study area. The affected big-game range under Alternatives D and E are reduced as follows:
- Alternative D: antelope (4,571 acres), elk (2,704 acres), mule deer (2,949 acres), and desert bighorn sheep (260 acres).
- Alternative E: antelope (6,345 acres); elk (4,019 acres); mule deer (3,547 acres), and desert big horn sheep (260 acres).
- ROW vegetation clearing would alter habitats for special status wildlife species, including desert tortoise, sage-grouse, pygmy rabbit, western burrowing owl, bald eagle, golden eagle, ferruginous hawk, bats, dark kangaroo mouse, Gila monster, and Mojave Poppy Bee. Habitat alterations for Mojave Poppy Bee would be the same, but special status and wildlife species would be reduced for Alternatives D and E.
- Potential effects associated with the electrical power lines include bird collisions, electrocution, and increased predation on desert tortoise, pygmy rabbit, and other wildlife species by raptors.

Aquatic Biology:

See Section 3.7

- Habitat alteration and potential water quality effects would occur on one perennial stream containing game fish and special status fish species crossed by the pipeline ROW. There would be no perennial stream crossings by the pipeline ROW under Alternatives D and E.
- No springs with aquatic biological resources are located in ROWs for any of the alternatives.
- There may be temporary water quality effects on two perennial streams containing game fish species crossed by the power line ROW. No perennial streams would be crossed by the power line ROW under Alternatives D.
- Potential habitat alteration and water quality effects on numerous intermittent streams potentially containing macroinvertebrates crossed by the pipeline and power line ROWs.
- Potential amphibian mortalities near waterbodies crossed by vehicles using the ROWs and access roads.

Land Use:

See Section 3.8

- ROW vegetation clearing would affect surface uses (grazing and recreation) on 12,303 acres of land, 97 percent of which is managed by the BLM.. Up to 1,103 acres would be converted for aboveground facility uses which would preclude existing uses. ROW clearing would be less for Alternatives D and E (See Vegetation).
- Instead, the short-term disturbance would occur over several years, with reclamation proceeding once all construction in a segment is completed.
- BLM lands for disposal would not be limited by ROW construction or operation.
- Approximately 25 percent of the estimated short-term disturbance would be located outside of designated utility corridors. For Alternatives D and E, the comparative estimates are 7 percent and 15 percent, respectively.
- ROWs and ancillary facilities would cross two ROW avoidance areas – Coyote Springs and Kane Springs Areas of Critical Environmental Concern – where additional stipulations may be imposed.

Recreation:

See Section 3.9

- Construction activities in some locations may result in short-term conflicts with off-highway vehicle race routes.
- ROW vegetation clearing would affect some lands within the Caliente Special Recreational Permit, Chief Mountain Special Recreational Management Area, Las Vegas Valley Special Recreational Management Area, Loneliest Highway Special Recreational Management Areas, Pioche Special Recreational Permits, and Steptoe Valley Wildlife Management AreaA. The Loneliest Highway Special Recreational Management Areas would not

be crossed under Alternative D, and Alternatives D and E would both avoid the Steptoe Valley Wildlife Management Area.

- Short-term interference with hunting access and other dispersed recreation use on public lands, with the location of such interference shifting over time as construction moves along the ROW.
- Long-term effects on recreation would result from alteration of the recreational setting with above-ground structures and vegetation alteration.
- Project road improvements would result in an increased potential for off-highway vehicle route proliferation and unauthorized public use of project ROWs that could degrade the recreation setting.

Transportation:

- Construction would result in short-term increases in vehicular traffic on roads and highways in the area, resulting in increased risk for vehicular accidents, vehicle/animal collisions, and traffic delays. Long-term effects would be limited due to relatively low maintenance and operation-related traffic numbers.

See Section 3.10

Minerals:

- Potential short-term access restrictions to ongoinig mineral extraction sites until roadways are restored after construction is completed.

See Section 3.11

Rangeland:

- ROWs for the Proposed Action and Alternatives A – C would cross 23 grazing allotments; resulting in aggregate disturbance to 10,544 acres during construction. Alternatives D and E would cross 14 and 20 grazing allotments, respectively, with aggregate disturbance of 7,162 and 8,937 acres for these 2 alternatives.
- Following reclamation, there would be permanent commitment e of 708 acres in 18 allotments associated with aboveground facilities for the Proposed Action and Alternatives A through C. Permanent land commitments for Alternatives D and E would affect a total of 564 acres in 11 allotments, and 562 acres in 16 allotments, respectively, for these two alternatiaves.

See Section 3.12

Wild Horses:

- ROW vegetation clearing would affect 3,015 acres in two wild horse management areas, and long-term aboveground facility commitments of 164 acres within 2 herd management areas. Short term construction activities could affect movement and forage use by wild horse herds within herd management areas. Due to the location of the herd management areas, the same effects would occur under Alternatives D and E.

See Section 3.13

Special Designations:

- ROW vegetation clearing would affect three special designations: Coyote Spring area of critical environmental concern, Kane Springs area of critical environmental concern, Desert National Wildlife Range. Due to the locations of these special designation areas, the same effects would occur under Alternatives D and E.

See Section 3.14

Visual Resources:

- Given climatic constraints on successful re-vegetation, potential visual impacts resulting from changes in woody vegetation in disturbed areas would be visible in the long term until woody vegetation becomes re-established, especially in the linear pipeline/power line ROW.
- While texture and color contrasts might be partially mitigated by using appropriate earth-toned building materials and colors, in general, new buildings, structures, and their shadows would be prominent in the landscape foreground.

See Section 3.15

- The scale of linear aboveground and surface-disturbing activities (across more than 300 miles), high visibility from scenic byways and special designation areas, and long duration within view from Highway 93 would result in long-term visual impacts from sensitive viewpoints.
- Although outside the Great Basin National Park boundary, the surface disturbance associated with the Proposed Action, and alternatives A, B, C, and E facilities would not meet the intent of National Park Service scenery management objectives. Alternative D facilities would be located entirely within Lincoln County, and 15 or more miles from the nearest Great Basin National Park boundary.

Cultural Resources:

Section 3.16

- Potential adverse effects to National Register of Historic Places-sites would be mitigated prior to construction.
- Some unanticipated discoveries and potential loss of cultural resources would occur during construction.
- Potential illegal collection of artifacts or vandalism to cultural resources could occur, as a result of to construction access and construction work force.

Native American Traditional Values:

Section 3.17

- Potential short and long-term effects to traditional cultural properties, sacred sites, and areas of cultural or religious importance could occur during the construction period.

Socioeconomics:

Section 3.18

- Temporary gains in employment, income, population, and related effects would occur, with the focus of activity shifting over time, from south (Clark County) to north (southern White Pine County).
- Short-term demand for temporary housing may exceed availability especially in Lincoln County.
- Short-term demands on local law enforcement and emergency services may strain capacity in rural communities.
- Fiscal pressures on budgets could result in White Pine and Lincoln counties due to temporary demand on county services. Project construction would generate substantial sales and use taxes, some of which would accrue to local governments.
- The existing agreement between SNWA and White Pine County provides payments in lieu of taxes to cover reductions in tax revenues associated with SNWA purchases of private ranches.
- SNWA facilities would be exempt from local property taxes.
- Limited direct long-term employment, population, or population related effects would occur during operations.
- Onset of construction of the project would be a “signal” event, with potentially widespread and long-term social concerns related to quality of life and outlook for the future, both from opponents and proponents of the project. In the rural areas, the effects are likely to be perceived as negative; in the Las Vegas Valley perceptions would be more favorable. The perception of long-term social effects in the rural areas would be lower in White Pine County under Alternatives D and E.

Socioeconomic Effects

Short-term: increases in jobs, income, demand for temporary housing, demand on law enforcement and emergency medical services, effects on individual and community social conditions.

Alternatives D and E result in fewer social and economic effects in White Pine County, particularly Snake Valley.

Long-term: Social and economic effects directly related to system operations would be limited.

Public Health and Safety:

Section 3.19

- There would be a short-term potential for spills or leaks from use of hazardous materials mostly consisting of fuels and lubricants during construction and operation.

3.7 How is climate change addressed in the EIS?

Secretarial Order 3226 (Amendment 1) requires that the Department of Interior bureaus and agencies consider and analyze the potential effects of climate change on environmental resources when undertaking long-range planning exercises, setting priorities for scientific research and investigations, and/or when making major decisions affecting their resources. For this draft EIS, climate change is addressed for all resources in Air and Atmospheric Values, Section 3.1.1.4. The initial air resources discussion provides historic and predicted future trends for climate parameters (temperature and precipitation). This information establishes the basis for the historic and future trends for water resources and other water-dependent resources. Based on relevant literature, the trends or potential effects of climate change are discussed for environmental resources. These potential changes could contribute to pumping effects from the GWD Project. These trends or changes could be applied in a general way to all pumping alternatives discussed for the GWD Project. However, the current state of climate science prevents climate-related effects to be related to specific alternatives analyzed in this draft EIS.

3.8 There are four localized alignment options. What are they and how would the environmental effects differ with any of these options?

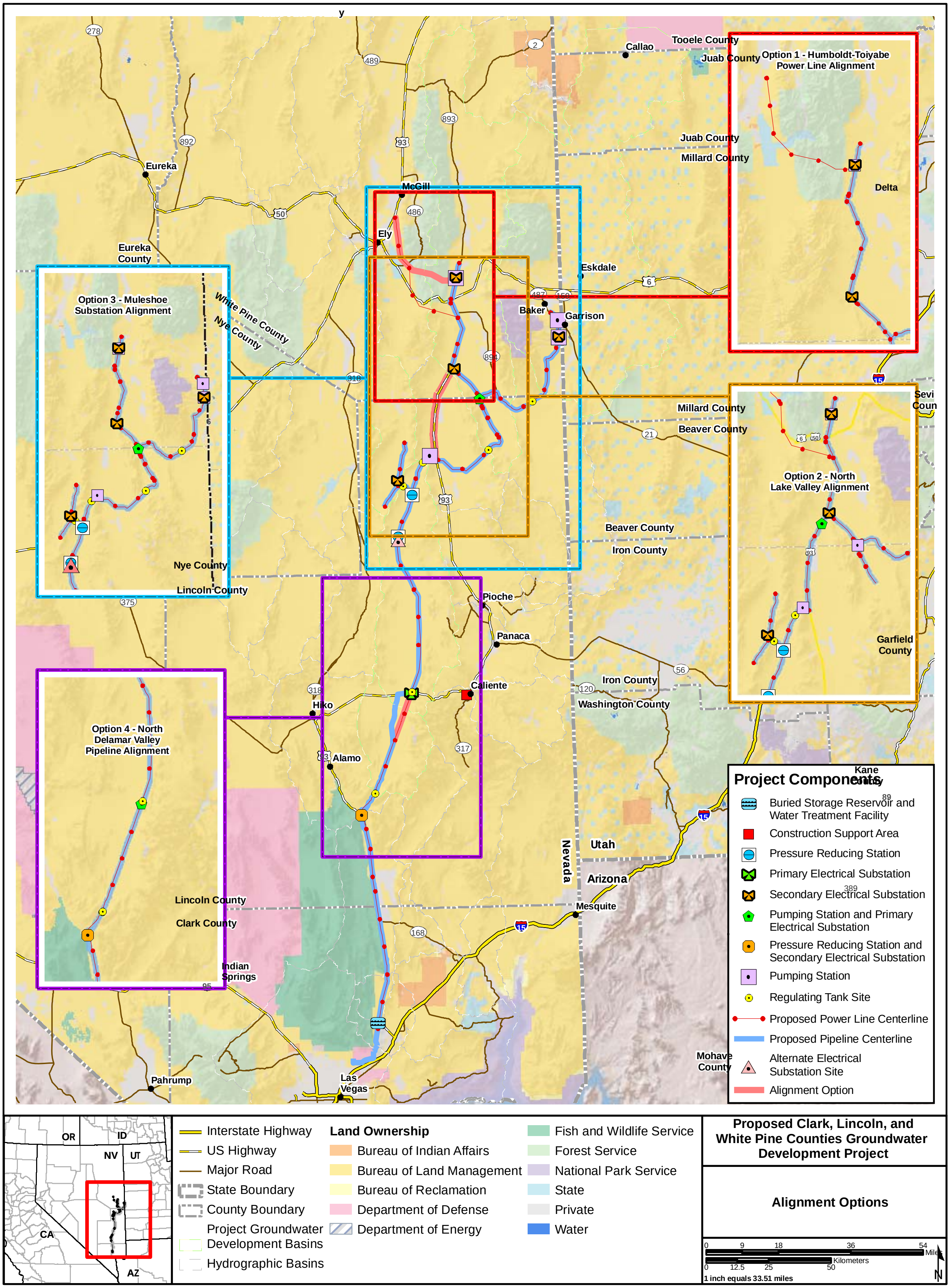
The EIS assesses the potential environmental effects of four localized alignment options. Each option involves a selected segment of the main pipeline or power line alignments. Each of these options involve potential trade-offs in terms of environmental effects, but also depend on factors beyond SNWA's or the BLM's control, e.g., completion of another transmission line.

Table ES-5 below describes these options, the rationale for the option, and the compatibility of a specific option with each of the 3 major ROW alignments. **Figure ES-10** on the following page shows the locations of these localized alignment options.

Table ES-5 Local Alignment Options

Alignment Option	Option Description/Rationale	Would the Option Be Compatible with the Following ROW Alignment Alternatives?		
		Proposed Action and Alternatives A through C	Lincoln County Conservation, Recreation, and Development Act (Alternative D)	Spring / DDC (Alternative E)
1	**Humboldt-Toiyabe Electrical Power Line Alignment:** Locate the Gonder to Spring Valley segment of the electrical power line in an existing corridor across United States Forest Service land to reduce new disturbance.	**Yes**	**No**	**Yes**
2	**North Lake Valley Pipeline and Electrical Power Line Alignment:** Locate a segment of the main pipeline and power line within an existing transportation utility corridor (U.S. 93).	**Yes**	**No**	**Yes**
3	**Muleshoe Substation and Power Line Alignment Option:** Utilize an alternative electrical power supply from a new regional transmission line, thereby avoiding construction of the Gonder to Spring Valley power line.	**Yes**	**No**	**Yes**
4	**North Delamar Valley Pipeline Alignment:** Locate segments of both the pipeline and power line within the Lincoln County Conservation, Recreation, and Development Act corridor to reduce new disturbance.	**Yes**	**Yes**	**Yes**

Alignment Options #1 and #3 are mutually exclusive.



No Warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual use or aggregate use with other data.

Figure ES-10 Localized Alignment Options for the Main Pipeline and Transmission Line

Because of the localized nature of these alignment options, the differences in environmental consequences are also localized. Although these options may result in net changes in the overall level of surface disturbance, the changes in locations also affect different resources. **Table ES-6** presents key differences in impacts associated with each of these options, as compared to the Proposed Action.

Table ES-6 Key Differences in Impacts for the Local Alignment Options as Compared to Those Under the Proposed Action

Alignment Option	Key Differences in Impacts
1 Humboldt-Toiyabe Power line	This option is approximately 6 miles shorter and steeper than the relevant segment of the Proposed Action. The estimated disturbance is 150 acres, compared to 245 acres under the Proposed Action. Key impact differences include: • Vegetation – There would be 24 fewer acres of vegetation disturbance and less removal of mature juniper and pinyon pine trees. • Wildlife – Reduced impacts to some big game species and 8 special status species or species groups. • Land Use – United States Forest Service lands (104 acres) would be crossed. • Recreation – There would be 43 percent less disturbance to the Loneliest Highway Special Recreational Management Area. • Visual – Overall visual effects would be reduced by following an existing transmission line and road corridors.
2 North Lake Valley Pipeline	This option requires an additional Pumping Station in southern Spring Valley, reduces the power line voltage from 230 to 69 kilovolts, and adds approximately 5 miles compared to the relevant segment of the Proposed Action. A net increase in disturbance of 60 acres. Key impact differences include: • Water Resources – Potential water quality changes to one perennial stream (Geyser Creek in Lake Valley) and three springs located within the ROW. • Vegetation – There would be 23 additional acres of sagebrush shrubland removed and the long-term loss of 5 acres for pump station site. • Wildlife – Both increased and decreased disturbance to various big game and special status species. • Aquatic Resources – Potential habitat alteration and effects on species in Geyser Creek and Wambolt Spring. • Visual – Overall visual effects would increase due to facilities being visible from a scenic byway.
3 Muleshoe Substation	This option requires completion of at least one other regional power line in the region, thereby allowing a new power line tie-in and eliminating the need for the Gonder to Spring Valley transmission line. Disturbance would be approximately 365 acres less than for the relevant segment of the Proposed Action. Key impact differences include: • Water and Aquatic Resources – Impacts would be reduced by the elimination of the Steptoe Creek crossing. • Vegetation – Vegetation disturbance would be reduced due to the elimination of the power line, but with 43 acres of disturbance to sagebrush shrubland for the Muleshoe Substation. • Wildlife - Both increased and decreased disturbance to various big game and special status species. • Recreation – There would be 47 percent less disturbance to the Loneliest Highway Special Recreational Management Area. • Visual – Overall visual effects would be reduced, eliminating 34 miles of power lines and access roads.
4 North Delamar Valley Pipeline	This option would place the pipeline and transmission lines within the Lincoln County Conservation, Recreation, and Development Act corridor in an area where the current alignment goes around a hill. An additional pumping station would be required, but the ROW would be approximately 3 miles shorter than the Proposed Action. Net disturbance would be 51 acres less than under the Proposed Action. Key impact differences include: • Vegetation – Additional loss of Joshua trees, yucca, and cacti in Delamar Valley. • Wildlife - Both increased and decreased disturbance to various big game and special status species. • Recreation – There would be increased disturbance for the Caliente Special Recreational Permit (6 percent) and Chief Mountain Special Recreational Management Areas (12 percent). • Special Designations – Impacts to Lands with Wilderness Characteristics would be reduced by eliminating 1 of 2 roadless units. • Visual Resources – Overall visual effects would be increased due to construction of a new pumping station near Highway 93.

After consideration of the potential resource effects of implementing each option, the following are brief conclusions concerning the tradeoffs as compared to the Proposed Action, and other applicable alternatives:

- Humboldt-Toiyabe Power line. This option provides an opportunity to reduce both surface disturbance area and visual resource effects to scenic byways by locating the transmission line in an existing Forest Service transmission line corridor.
- North Lake Valley Pipeline. This option allows reduction in transmission line voltage, but increases the number of aboveground facilities near and adjacent to Highway 93, thereby increasing the overall project visibility from a scenic byway. This alignment would result in additional impacts to one perennial stream and three springs compared to the Proposed Action.
- Muleshoe Substation. This option would eliminate the need for constructing a 230-kilovolt transmission line from Gonder Substation to Spring Valley, with a consequent reduction in long term visible surface disturbance in the vicinity of a scenic byway, and an overall reduction of wildlife habitat disturbance. The feasibility of this option is substantially improved by the current construction of the ON Transmission Line where the Muleshoe Substation would interconnect.
- North Delamar Valley Pipeline. This option would reduce the overall surface disturbance effects to Mojave Desert shrublands (including mature Joshua trees) by using an existing utility ROW. However, this option would require construction of a new pumping station which would be located very close to Highway 93, adding a new aboveground structure that would be visible to highway travelers.

3.9 What future facilities would be required for groundwater development?

Completion of the future groundwater production facilities, including wells, power lines, access roads, collector pipelines, and ancillary facilities, would result in additional temporary and long-term disturbance. The exact number and locations of wells is presently unknown. Consequently, a series of assumptions were developed to allow programmatic analysis of the environmental effects of the future development. Additional ROW requests and subsequent NEPA would be conducted for specific sites after the SNWA establishes their locations. The programmatic level of development, temporary and permanent ROW associated with the future facilities for each alternative is summarized below in **Table ES-7**.

Table ES-7 Summary of the Alternatives for Analysis in this EIS

ROW and Facility Requirements	Proposed Action	Alternative A	Alternative B	Alternative C	Alternative D	Alternative E
Groundwater Production Wells (number)	144 to 174	97 to 117	136	97 to 117	69 to 83	69 to 83
Collector Pipelines (miles)	177 to 434	100 to 246	236	100 to 246	127 to 206	86 to 210
Staging Areas (number of 1-acre sites)	59 to 145	33 to 82	79	33 to 82	42 to 69	29 to 70
Electric Power Lines (miles)	177 to 434	100 to 246	236	100 to 246	127 to 206	86 to 210
Permanent ROW (acres)	2,373 to 5,537	1,459 to 3,338	2,448	1,459 to 3,338	1,238 to 2,586	1,158 to 2,684
Temporary ROW (acres)	1,214 to 2,875	742 to 1,727	1,261	742 to 1,727	834 to 1,368	595 to 1,316

3.10 When and how will NEPA compliance be completed for these Future Facilities?

After the SNWA identifies specific details of the groundwater development components, it will submit additional ROW applications to the BLM. Based on these applications, the BLM will address the site-specific effects in subsequent NEPA documents. The subsequent documents will conform to NEPA requirements with full public involvement, including scoping and document review.

3.11 What are the relative environmental effects of implementing these future facilities?

The SNWA does not anticipate filing ROW applications for groundwater production wells and collector pipelines until after the completion of the NSE rehearings on its water rights applications. Consequently, the level of detail regarding future facilities development, including the number and location of wells, lengths and routes of collector pipeline and distribution power lines, and road access, is inadequate to support analysis in this EIS process. The environmental effects of that future development, including the long-term effects of groundwater production, are therefore, the subject of conceptual analysis in this EIS. The conceptual analysis encompasses the entire groundwater development areas where production wells, collector pipelines, and distribution power lines might be located for each alternative and assumptions regarding the type and range of facilities to be developed. The range of facilities reflects the assumed level of groundwater pumping associated with each alternative. (See **Table ES-7** above, and draft EIS, Chapter 2 and Appendix E, for more information regarding Future Facilities development.)

Appendix E

Like the pipeline, future facility development and pumping would be phased, beginning in the southern basins (Delamar, Dry Lake, and Cave), moving northward into Spring and Snake valleys in later years. SNWA's proposed development schedule for future facilities extends over nearly 35 years, beginning in 2016 in Delamar Valley – see **Table ES-8**. The proposed schedule provides for complete system build out and achieving full pumping volume by the year 2050 for the Proposed Action and Alternatives A through C. The time frames for build out of Alternatives D and E are projected to be the year 2043. No facilities would be constructed in Snake Valley, resulting in an earlier project completion date. The actual timing of future facilities development would depend on water availability from SNWA's other sources, demand, and drought.

Table ES-8 Timing of Future Facility Development, By Basin and Alternative

Groundwater Basin	Production Well Development Period [1]	Basin Included In Alternative					
		Proposed Action	A	B	C	D	E
Delamar, Dry Lake and Cave	2016 to 2019	Yes	Yes	Yes	Yes	Yes	Yes
Spring Valley – south (Lincoln County)	2020 to 2022	Yes	Yes	Yes	Yes	Yes	Yes
Spring Valley – north (White Pine County)	2038 to 2039	Yes	Yes	Yes	Yes	No	Yes
Snake Valley	2047 to 2049	Yes	Yes	Yes	Yes	No	No

[1] Exploratory development would occur in each basin prior to the production well development. Specific development plans would be submitted to BLM based on exploratory drilling and Tier II NEPA completed for the specific plans.

Environmental effects associated with the future facilities development would be similar to those described for ROW facilities, but smaller in scale. Unlike the relatively wide, linear corridor associated with the pipeline ROW, the disturbance area for each groundwater production well would be a rectangular parcel, accessed via an improved road that would be co-located with the collector pipelines in a 50-foot permanent right of way. **Table ES-9** summarizes the environmental impacts for the future facilities.

Table ES-9 Summary of Future Groundwater Development Impacts Associated with Surface Disturbance for the Proposed GWD Project Alternatives

Disturbance/Impacts	Proposed Action	Alternatives A and C	Alternative B	Alternative D	Alternative E
Temporary Disturbance (Acres) [1, 2]					
Spring Valley	1,187 - 2,805	813 - 1,873	2,461	1,559 - 1,801	813 - 1,855
Snake Valley	443 - 969	311 - 723	1,163	0	0
Cave Valley	565 - 1,623	226 - 738	307	226-736	226 - 736
Dry Lake Valley	395 - 834	395 - 834	318	395 - 834	395 - 834
Delamar Valley	940 - 2,034	291 - 563	336	291 - 563	291 - 563
Impacts Related to Disturbance Acres					
Air Resources, Geology, Soils, Vegetation, Wildlife. Land Use, Transportation, Minerals, Rangeland, Wild Horses, Visual Resources, Cultural Resources, Native American Traditional Values, Public Health and Safety	Construction and operation-related disturbance impacts could occur in all five groundwater development basins with relative effects related to the range in acres of disturbance listed above. The types of impacts would be the same as those discussed for ROWs.			Construction and operation-related disturbance impacts could occur in four of the five groundwater development basins (Snake Valley eliminated) with relative effects related to the range in acres listed above. The types of impacts would be the same as those discussed for ROWs.	
Impacts to Other Resources					
Water Resources (Stream reaches and springs potentially affected by disturbance)	• 28 perennial stream reaches in Spring and Snake valleys. • 60 springs in the 5 valleys.	• Same as the Proposed Action.	• 3 perennial stream reaches in Snake Valley. • 7 springs in Snake Valley.	• No disturbance to perennial stream reaches. • 13 springs in Spring, Cave, Dry Lake, and Delamar valleys.	• 23 perennial stream reaches in Spring and Cave valleys. • 49 springs in Spring, Cave, Dry Lake, and Delamar valleys.
Aquatic Biological Resources (Disturbance effects to aquatic habitat and species (game fish, special species or native species).	Number of waterbodies with game fish or special status aquatic species: • 17 perennial streams in Spring and Snake valleys. • 3 springs in the 5 valleys. • Potential mortalities to amphibians during movement periods from vehicular traffic.	• Same as the Proposed Action.	Number of waterbodies with aquatic species (non-game and non-special status species: • 1 perennial stream in Snake valley and 1 spring in Snake Valley. • Potential mortalities to amphibians during movement periods from vehicular traffic.	• No disturbance to perennial streams or springs, with game fish or special status species. • Potential mortalities to amphibians during movement periods from vehicular traffic.	Number of waterbodies with game fish or special status aquatic species: • 13 perennial streams in Spring and Snake valleys • 3 springs in Spring Valley. • Potential mortalities to amphibians during movement periods from vehicular traffic.

Table ES-9 Summary of Future Groundwater Development Impacts Associated with Surface Disturbance for the Proposed GWD Project Alternatives (Continued)

Disturbance/Impacts	Proposed Action	Alternatives A & C	Alternative B	Alternative D	Alternative E
Recreation	• 5 recreation areas.	• Same as Proposed Action.	• 2 recreation areas.	• 4 recreation areas.	• 5 recreation areas.
Special Designation Areas (Number of areas with potential disturbance)	• 4 areas in Spring, Snake, and Delamar valleys.	• Same as Proposed Action.	• Same as Proposed Action.	• 1 area in Delamar Valley.	• 3 areas in Spring and Delamar valleys.
Visual Resources (Viewshed effects on Great Basin National Park	• Distant views (3 to 10 miles) of project facilities in Spring and Snake Valleys from high elevation viewpoints.	• Distant views (3 to 10 miles) of project facilities in Spring and Snake Valleys from high elevation viewpoints.	• Distant views (3 to 10 miles) of project facilities in Spring and Snake Valleys from high elevation viewpoints.	• No views of project facilities because all development would occur in Lincoln County.	• Distant views (3 to 10 miles) of project facilities in Spring Valley from high elevation viewpoints.
Socioeconomics	• Temporary employment and population gains. Limited scale and duration for each well. Multiple rigs could operate simultaneously in different locations. Increased intensity of social effects, both for those opposed and supporting the project.			• Same as the Proposed Action but less intense in White Pine County.	• Same as the Proposed Action but less intense in White Pine County.

[1] Permanent disturbance would be approximately 67 percent of the temporary disturbance.

[2] The ranges in temporary disturbance reflect the range in the number of wells to be developed and assumptions for the location/spacing between wells.

3.12 What cumulative surface disturbance impacts are anticipated in conjunction with the GWD Project?

Cumulative impacts are defined as "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time" (40 CFR 1508.7).

Interrelated projects and actions defined for this EIS are those past, present and reasonably foreseeable future actions that could interact with the Proposed Action. The cumulative effects analysis for the draft EIS is separated into two parts; those with potential to interact with the Tier 1 facilities in terms of surface disturbance and those with potential to interact with groundwater development (pumping). The primary unit of geographic analysis is the hydrographic basin, specifically those basins where surface disturbance from project-related activities would be anticipated.

Tier 1 Project Facilities

This analysis focuses primarily on the interactions of:

1) GWD Project facilities; mainline pipeline, ancillary facilities, and future facilities, by alternative;
2) Past and present actions: existing energy and transportation infrastructure, and current land uses (mining, grazing, recreation); and
3) Surface disturbance projects and activities that meet the reasonably foreseeable criteria for inclusion. Prospective projects that did not meet the inclusion criteria are identified on **Table 2.9-2**.

Section 2.9

Past and Present Actions for the Cumulative Analysis
(see Section 2.9 of the DEIS for more information)

Roads and Railroads • Populated Places • Agricultural Lands • Wildland and Forest Fires
Vegetation treatment areas • Mining districts • Section 386 Energy Corridors Zones • ROWs

Reasonably foreseeable future actions were compiled to determine overlapping relationships with the GWD Project. An initial screening of reasonably foreseeable future actions used a variety of resources:

- The BLM Ely District and Las Vegas District pending project lists;
- The Nevada Division of Environmental Protection list of mining projects;
- The Nevada Wind Energy Projects list;
- Projects that are addressed in the cumulative impact sections of other water project NEPA analysis (e.g., Kane Springs Groundwater Development EIS [BLM 2008]) in the area of interest;
- Internet and literature searches; and
- Pending Utah projects gathered from the BLM Fillmore and Cedar City web sites.

The project lists and descriptions were then reviewed and compared to the following three criteria to determine the projects to be included in the cumulative analysis.

1. A ROW application and preliminary Plan of Development have been filed with the BLM, along with evidence of project advancement, i.e., periodic meetings with BLM, or documented initiation of a NEPA process.
2. Evidence of continued development activity for projects approved under an EA or EIS process.

3. Development on private land that shows evidence of progress within the past year, e.g., applications for permits filed with local governments, or evidence of new construction based on aerial photo reviews.

- Based on these criteria the following reasonably foreseeable projects and associated development areas (hydrologic basins) were identified.

Wilson Creek Wind Project: Located between southern Spring and northern Lake Valley within an overall proposed development area of approximately 31,000 acres.

Spring Valley Wind Project: Located north of the intersection of Highways 93 and 6&50 in Spring Valley within an overall development area of 7,653 acres.

ON Transmission Line Project: Located in a 200 foot wide ROW within an approved BLM utility corridor between a substation west of Ely in White Pine County and a terminus at the Harry Allen Power Plant in Clark County.

Kane Springs Valley Groundwater Development Project: This groundwater development and pipeline system is located in Kane Springs and Coyote Spring Valleys northeast of the Lincoln/Clark County line, Nevada. Other residential, commercial, industrial and recreational development will also occur in the Coyote Springs Investments development.

Eastern Nevada Transmission Line Project: This project is proposed in two separate alignments in Clark County, Nevada. One alignment extends from the Gemmill substation near the U.S. Highway 93 and Nevada Highway 168 intersection (south of the Coyote Spring private land block) to a substation near Moapa. The second alignment extends from the Silverhawk power plant to a substation south of Henderson).

Geographic Information System mapping was used to estimate the surface disturbance for the past, present, and reasonably foreseeable future projects within the 14 hydrographic basins where groundwater development facilities would be constructed and operated. These basins encompass a total area of 8.6 million acres. Estimated cumulative disturbance in the area is approximately 717,600 acres (10.6 percent) – see **Figure ES-11**. Past and Present Actions, consisting primarily of roads, other utilities, agricultural uses, mines, and settled areas and the footprints of recent large regional wildfires and BLM vegetation management areas, account for the overwhelming majority of the total.

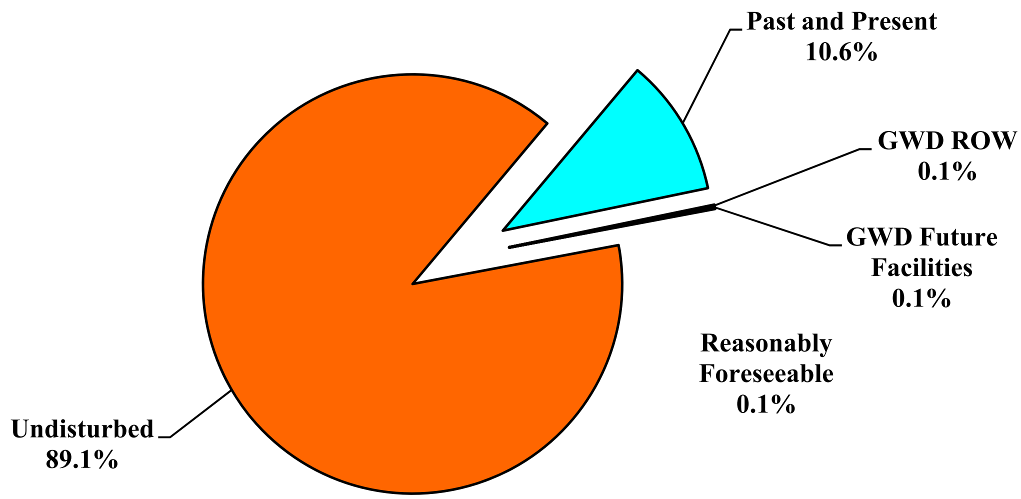


Figure ES-11 Summary of Surface Disturbing Actions for Past, Present and Reasonably Foreseeable Future Actions in 14 Hydrographic Basins Crossed by the GWD Project Facilities

The GWD Project would contribute less than one percent of the total area of hydrographic basins where groundwater development facilities would be located; the foreseeable projects would also contribute less than 1 percent.

The GWD Project Proposed Action surface disturbance estimate is the sum of the temporary ROW and groundwater development impacts for a total of 20,568 acres (rounded to 20,570 acres). The cumulative effects of the Proposed Action, and Alternatives A through C would be similar, and are discussed below. The cumulative surface disturbance effects of Alternatives D and E would be less than the other alternatives, because no groundwater development would occur in Snake Valley.

Summary of GWD Project Tier 1 Cumulative Surface Disturbance Effects

Air and Atmospheric Values

Groundwater development facilities would be constructed several years after other foreseeable projects (ON Transmission Line, Wilson Creek Wind, and Spring Valley Wind) that would share the same utility corridor. Therefore the individual project construction periods would not overlap and the GWD Project would not contribute to cumulative increases in construction equipment emissions and fugitive dust.

Geologic Resources

Geologic hazards (e.g. fissures, faults, karst voids and caves) are generally not cumulative in their effects. A hazard encountered by one project typically decreases the damage risks for subsequent projects in the same corridor because the hazards become better known and engineering solutions improve.

Surface disturbance of paleontological resources by the GWD Project could result in cumulative losses of valuable fossil material as the result of excavations by all projects sharing the same utility corridor. BLM would implement paleontological monitoring and appropriate fossil material recovery to limit losses.

Water Resources

The GWD Project and other actions would contribute small, localized cumulative increases in soil erosion and sediment yield to ephemeral and intermittent stream channels crossed by ROWs, and in new areas of surface disturbance caused by foreseeable projects. The majority of these cumulative sediment increases would occur in the existing utility corridors and in the Spring Valley Wind Development area where new road and construction disturbance would occur.

Soils

The GWD Project would temporarily disturb approximately 20,570 acres of native rangeland soils. This increase represents less than one percent of the total area of these hydrographic basins.

The GWD Project and other projects located in the same utility corridor would not contribute cumulative increases in soil erosion from disturbed surfaces because: 1) the GWD Project and each foreseeable project would be required by BLM BMPs to control soil erosion, and to revegetate disturbed surfaces; and 2) GWD Project facilities would be constructed several years after other foreseeable projects that would share the same utility corridor (ON Transmission Line, Wilson Creek Wind, Spring Valley Wind).

Vegetation

The GWD Project would remove approximately 20,570 acres of native vegetation from ROWs in the hydrographic basins where the GWD Project facilities would be located. This vegetation removal increase represents less than 1 percent of the total area of these hydrographic basins. The primary vegetation communities affected by cumulative surface disturbance sources include sagebrush shrubland, greasewood/salt desert shrubland, and Mojave mixed desert shrubland.

The GWD Project and other projects constructed in the same utility corridors would incrementally contribute to reduced plant community productivity and diversity because of long vegetation recovery times, losses of individuals of sensitive species populations, an increased risk for non-native invasive species invasion, and small reductions in populations of plants used traditionally by Native Americans. GWD Project facilities would be constructed several years after other foreseeable projects that would share the same utility corridor (ON Transmission Line, Eastern Nevada Transmission Line, Wilson Creek Wind, and Spring Valley Wind).

Terrestrial Wildlife

The GWD Project would remove approximately 20,570 acres of native wildlife habitats from ROWs in the hydrographic basins where GWD Project facilities would be located. This habitat removal represents less than 1 percent of the total area of these hydrographic basins.

GWD Project facilities would be constructed several years after other foreseeable projects that would share the same utility corridor (ON Transmission Line, Wilson Creek Wind, and Spring Valley Wind). However, the long vegetation recovery times would result in increases in habitat fragmentation as new project surface disturbance is added to utility corridors over time. These disturbed corridors would contain vegetation at varying levels of recovery.

The primary surface disturbance cumulative effects on wildlife habitats and populations would be:

- Overall wildlife habitat fragmentation where new and existing ROWs overlap, or intersect, resulting in changes in wildlife population habitat occupation and movement.
- Habitat fragmentation and increased human activity in pronghorn and mule deer winter ranges in Spring Valley.
- Fragmentation and loss of desert tortoise and Gila monster habitat in the Mojave Desert region (Delamar, Coyote Springs, Hidden, and Garnet valleys), and increased predator perching sites provided by electrical distribution lines. Fragmentation of greater sage grouse habitat in valleys dominated by big sagebrush vegetation (Spring, Snake, Cave, and Lake Valleys). Of specific fragmentation concern are the shared utility ROWS in these valleys, as well as the overlap with the Spring Valley Wind development.

Fragmentation of pygmy rabbit habitat in sagebrush and desert shrubland habitats in Dry Lake, Cave, Lake, and Spring Valleys, and an increase in predator perching sites provided by electrical distribution lines.

Aquatic Biological Resources

The GWD Project would expand the network of roads and pipelines throughout the primary groundwater development basins. It is not expected that the cumulative development would substantially increase the surface disturbance to aquatic biological resources, because only three perennial streams (Snake Creek and Big Wash in Snake Valley, Steptoe Creek in Steptoe Valley) would be crossed by the GWD Project facilities. Based on the use of avoidance criteria, the GWD Project would not contribute incremental sedimentation effects on Bonneville cutthroat trout streams. Increased traffic on roadways could locally affect northern leopard frog populations in Spring Valley where the GWD Project would overlap with the Spring Valley Wind Project.

Land Use

The GWD Project would convert approximately 6,550 acres of land used for a combination of livestock grazing and wildlife habitat to long-term (life of project) industrial uses (permanent ancillary facilities). This conversion represents less than one percent of the total area of the hydrographic basins where GWD Project facilities would be constructed.

Recreation

Construction of the GWD Project is not expected to cause a cumulative reduction in dispersed recreational user access to OHV trails, and Special Recreation Management Areas because GWD Project facilities would be constructed several years after other foreseeable projects (ON Transmission Line, Wilson Creek Wind, Spring Valley Wind) that would share the same utility corridor.

Transportation

Construction of the GWD Project is not expected to contribute to cumulative traffic congestion and increased accident risks on state and federal highways, and county roads because GWD Project facilities would be constructed several years after other foreseeable projects that would share the same utility corridor (ON Transmission Line, Wilson Creek Wind, and Spring Valley Wind).

Mineral Resources

The GWD Project is not expected to contribute to a cumulative reduction in access to mineral resources, because none of the GWD Project alternatives are expected to interfere, or preclude the extraction of minerals.

Rangelands and Grazing

Construction of the GWD Project would remove approximately 20,570 acres of native vegetation from ROWs in the hydrographic basins where GWD Project facilities would be located. The incremental vegetation removal affects less than 1 percent of the total area (more than 1.5 million acres) of all cumulative surface disturbance in these basins. No changes in livestock stocking rates in BLM allotments are anticipated.

The GWD Project would not contribute to cumulative livestock movements across grazing allotments, or access to water sources because GWD Project facilities would be constructed several years after other foreseeable projects (ON Transmission Line, Wilson Creek Wind, and Spring Valley Wind) that would share the same utility corridors.

Wild Horses

Construction of the GWD Project would remove approximately 3,200 acres of wild horse forage in the Silver King and Eagle Horse Management Areas. Combined with other cumulative surface disturbance, the net effect represents less than 1 percent of the area of these 2 wild horse management areas. These cumulative forage reductions are not expected to affect wild horse herd sizes established by the BLM appropriate management levels for these areas.

Construction of the GWD Project would not contribute to cumulative changes in herd movement across herd management areas and to water sources because GWD Project facilities would be constructed several years after other foreseeable projects (ON Transmission Line, Wilson Creek Wind, and Spring Valley Wind) that would share the same utility corridor.

Special Designations

Construction of the GWD Project may result in surface disturbance in five BLM Areas of Critical Environmental Concern. Areas of critical environmental concern are managed as avoidance areas, but BLM may grant ROWs if minimal conflicts exist with identified resource values, and if impacts can be mitigated.

Both the GWD Project and the ON Transmission Line would construct on ROWs through the Coyote Spring Areas of Critical Environmental Concern. This portion of the Areas of Critical Environmental Concern overlaps with the Lincoln County Conservation, Recreation, and Development Act utility corridor, which allows utility project construction and operation. The GWD project would cross portions of the Kane Springs Areas of Critical Environmental Concern, and the ON Transmission Line would disturb an area adjacent to the Areas of Critical Environmental Concern boundary. The GWD Project would be located within the Lincoln County Conservation, Recreation, and Development Act corridor. The cumulative surface disturbance of these two projects, combined with existing ROWS in the same corridor (including Highway 93) would cumulatively reduce the natural values for which the Areas of Critical Environmental Concern was designated (desert tortoise habitat protection).

Visual Resources

The GWD Project ROWs and facilities would result in cumulative visual resource changes where project ROWs parallel or cross existing roads and utility. The addition of wind energy projects on valley floors (Spring Valley Wind) and on ridge lines (Wilson Creek Wind) where GWD Project facilities would be located, and the co-location of the GWD Project facilities with the ON Transmission Line, and the Eastern Nevada Transmission Line in a common utility corridor would incrementally change the natural character of the hydrographic basins where these projects would be constructed. The following are visual resource cumulative effect conclusions by hydrographic basin:

- Dry Lake Valley, Delamar Valley, Coyote Springs Valley – strong contrasts and cumulative effects from the GWD Project main pipeline and groundwater development areas, combined with existing utility ROWs, new high voltage power lines, surface water developments, and roads. These projects and actions would be visible from the Silver State Trail Backcountry Byway and Highway 93.
- Lake Valley – strong contrasts and cumulative effects from the GWD Project main pipeline, combined with the Wilson Creek Wind Project, high voltage power lines, surface water developments, and roads. These projects and actions would be visible from the U.S. 93 scenic byway and the Silver State Trail Backcountry Byway.

- Spring Valley – strong contrasts and cumulative effects from the GWD Project main pipeline and groundwater development areas, the Spring Valley Wind Project, roads, surface water development, and fiber optic lines. These projects and actions would be visible from the U.S. 6/50/93 scenic byway, the Loneliest Highway special recreation management area, developed recreation and bird watching sites, Humboldt National Forest, and Great Basin National Park. Alternative D facilties would not overlap with the Spring Valley Wind Project.
- Steptoe Valley – strong contrasts and cumulative effects resulting from the GWD Project power line combined with roads, surface water developments, and existing power lines. These projects and actions would be visible from the U.S. 6/50/93 scenic byway, designated fishing and bird watching areas, and the Loneliest Highway and Egan Crest special recreation management areas.

The GWD Project's contribution to landscape changes may potentially conflict with BLM Visual Resource Management Classes II and III when considered with existing and foreseeable projects and actions where these projects and actions share viewsheds. The GWD Project, when considered with past and foreseeable actions, would conform with United States Forest Service and Great Basin National Park for lands these agencies directly administer, but would not meet the intent of Great Basin National Park viewshed preservation objectives outside the National Park boundaries.

Cultural Resources

The GWD Project would temporarily disturb approximately 20,570 acres of land in the hydrographic basins where GWD Project facilities would be located. This surface disturbance could result in cumulative losses of archaeological resources as the result of grading and excavations by the foreseeable projects (ON Transmission Line, Eastern Nevada Transmission Line, Wilson Creek Wind, Spring Valley Wind) sharing the same utility corridors. The BLM would implement pre-construction surveys to identify and avoid archeological sites where possible for all projects. The BLM would implement construction monitoring and unanticipated discovery plans to comply with its responsibilities under the federal cultural heritage regulations, and under its obligations to consult with affected Tribes.

Socioeconomics and Environmental Justice

The GWD Project would require temporary construction workers, demands for temporary housing, and demands on local law enforcement and emergency services. Based on the preliminary construction schedules of the foreseeable projects ON Transmission Line, Eastern Nevada Transmission Line, Wilson Creek Wind, Spring Valley Wind, Kane Springs Valley Water Development Project), it appears that the GWD Project peak construction period would occur after these projects are completed.

Public Health and Safety

Because health and safety issues are specific to the GWD Project pipelines and water development construction and operation locations, GWD Project facility construction and operations are not expected to contribute to cumulative effects with the identified past and present actions, or foreseeable projects.

4. Environmental Consequences - Programmatic Assessment of Long-Term Pumping Effects

4.1 How are the environmental effects of pumping on other resources addressed?

A groundwater flow model was developed for this draft EIS to evaluate the probable long-term effects of groundwater withdrawal on a regional scale. The study area for water resources encompasses 35 hydrographic basins shown in **Figure ES-12** and covers over 20,000 square miles. **Figure ES-12** also indicates the locations of inventoried springs and identified perennial stream reaches located within the region. Generally speaking, the analysis of pumping effects on environmental resources followed a series of steps that links the results of groundwater flow modeling to those resources with dependence on surface water and/or groundwater as a source of water or habitat.

The programmatic analysis of future pumping effects relies on the results of a regional groundwater flow model, covering more than 20,000 square miles and 35 hydrographic basins.

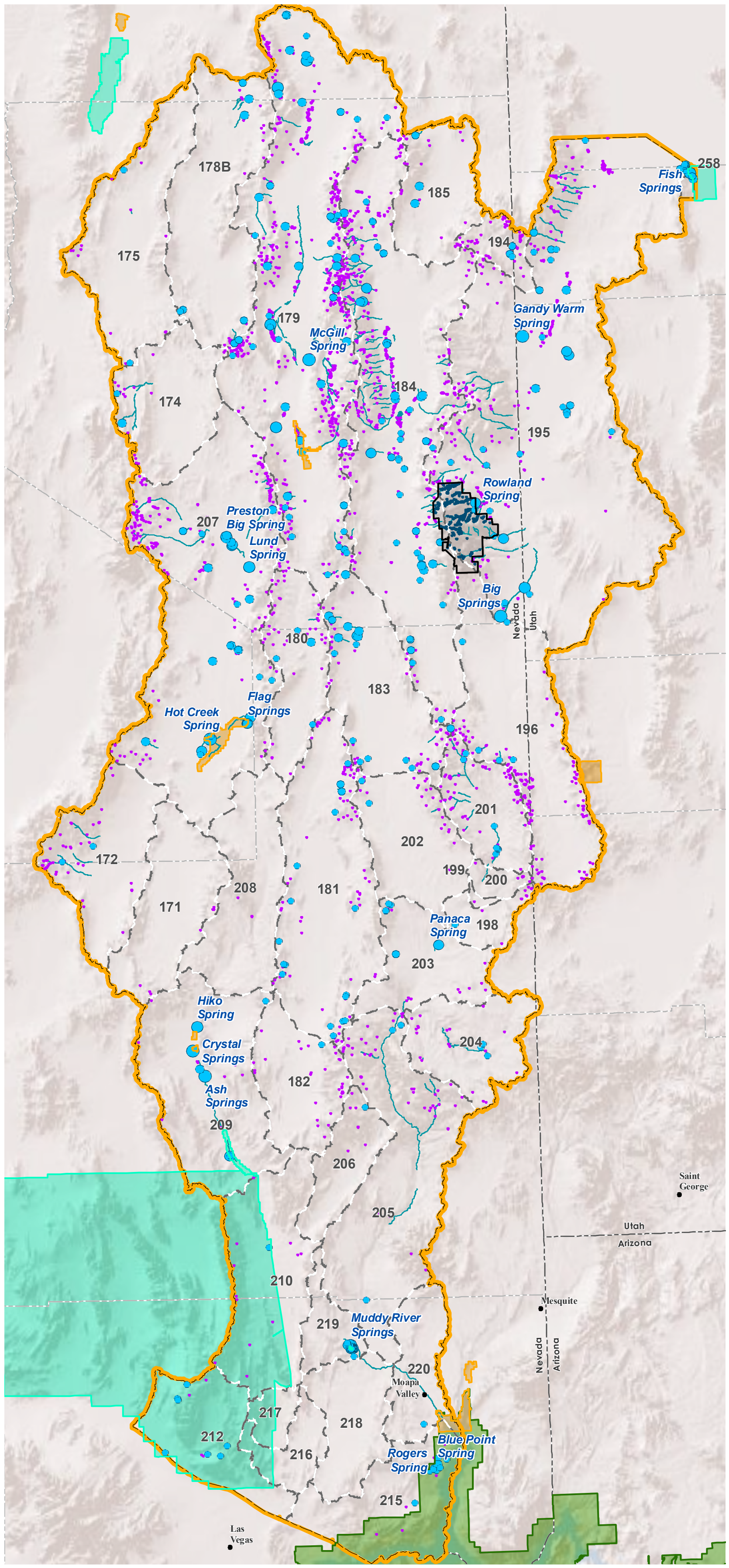
The groundwater flow model was used to simulate reductions in groundwater elevation (i.e., drawdown) occurring over time from pumping under the Proposed Action or other action alternatives. In addition to the groundwater drawdown, the groundwater flow model was used to simulate potential flow changes in selected springs, streams, and rivers. The model results were used to define the area of projected drawdown of 10 feet or more, relative to current groundwater elevations. An expected drawdown of 10 foot or more is used to identify the area of potential environmental effects, including those on surface water and associated habitat (springs, ponds, wetlands, meadows, perennial streams, playas, and swamp cedar woodlands), and phreatophytic shrubland vegetation. For phreatophytic shrubland vegetation, a 10-foot drawdown was also used to identify areas where loss of vegetation may occur.

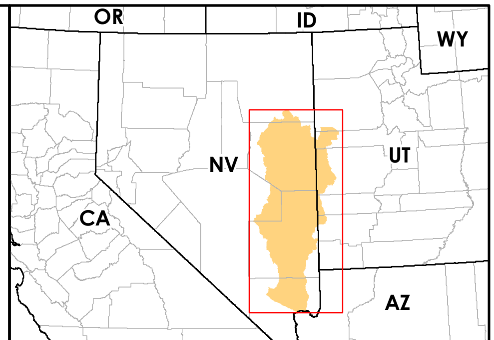
For other environmental resources, functional connections to surface water, vegetation and habitat, or groundwater were used to evaluate potential effects. Examples of resource effects due to drawdown include:

- Air and Climate – dust generation risk from soil surface drying.
- Geology – pumping induced ground surface subsidence.
- Soils – potential structural and functional changes in hydric soils.
- Wild Horses – changes in water availability and forage quality and quantity resulting in a possible decrease of the appropriate management levels of horses.
- Rangeland and Livestock Grazing – changes in water sources and forage resulting in possible changes to the carrying capacity of a grazing allotment.

The BLM established a technical review team to assist it by reviewing the model documentation reports and provide recommendations for improving the model. The team included hydrology specialists from the BLM Nevada and Utah State Offices, and National Operations Center in Denver; the U.S. Geological Survey: and AECOM (BLM EIS Contractor).

An electronic copy of the modeling report is included with this EIS.





Legend

Major Springs

Discharge (gpm)

- 0 - 10
- 10 - 100
- 100 - 1000
- 1000 - 2000
- 2000 - 4000
- 4000 - 8000
- Additional Spring Location[1]
- Great Basin National Park Spring
- Perennial Stream Reach
- Water Resources Region of Study
- Hydrographic Basin
- Great Basin National Park
- Lake Mead National Recreation Area
- National Wildlife Refuge
- State Wildlife Management Area

[1]These springs have not been field-verified (i.e. actual existence and flow characteristics are uncertain.)

Basin #	Basin Name	Basin #	Basin Name
171	Coal Valley	202	Patterson Valley
172	Garden Valley	203	Panaca Valley
174	Jakes Valley	204	Clover Valley
175	Long Valley	205	Lower Meadow Valley Wash
178B	Butte Valley (Southern Part)	206	Kane Springs Valley
179	Steptoe Valley	207	White River Valley
180	Cave Valley	208	Pahroc Valley
181	Dry Lake Valley	209	Pahranagat Valley
182	Delamar Valley	210	Coyote Spring Valley
183	Lake Valley	212	Las Vegas Valley
184	Spring Valley	215	Black Mountain Area
185	Tippett Valley	216	Garnet Valley
194	Pleasant Valley	217	Hidden Valley (North)
195	Snake Valley	218	California Wash
196	Hamlin Valley	219	Muddy River Springs Area
198	Dry Valley		
199	Rose Valley	220	Lower Moapa Valley
200	Eagle Valley	258	Fish Springs Flat
201	Spring Valley		

Proposed Clark, Lincoln, and White Pine Counties Groundwater Development Project

Figure ES-12

Perennial Streams and Springs

0 5 10 15 20 25 50 Miles
0 5 10 15 20 25 50 75 Kilometers
1:2,000,000

N

No Warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual use or aggregate use with other data.

- Special Designations – potential changes in the natural and cultural values for which areas were designated.
- Native American Concerns – changes in water quantity and quality that could affect resources and places of traditional value.

The connections between pumping effects on surface waters and other resources are illustrated in **Figure ES-13**.

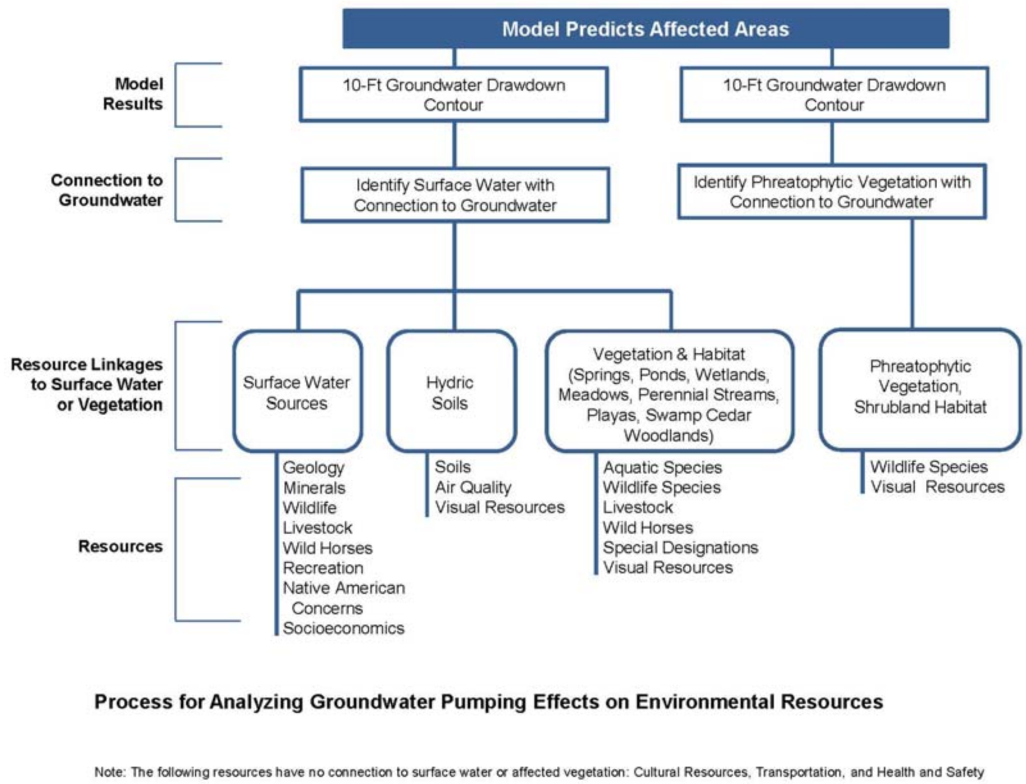


Figure ES-13 Process for Analyzing Groundwater Pumping Effects on Environmental Resources

4.2 How were the effects of long-term pumping on water resources determined?

The computerized model was calibrated to water levels and flow measurements in the field. The groundwater model represents a generalized understanding of the surface and underground water and hydrogeologic conditions over this large region. The model was used to simulate groundwater withdrawal for the seven alternatives for analysis (i.e., the six action alternatives and the No Action). The assumed time frame for full build out of the groundwater development under the Proposed Action is the year 2050 and the modeling results were evaluated at three future time frames: full build out, full build out plus 75 years, and full build out plus 200 years.

Results of the regional groundwater flow model were used to evaluate the effects on water resources at three time frames that correspond to full build out of the system (approximately 2050), and at full build out plus 75 and full build out plus 200 years after full build out.

Despite inherent uncertainty associated with hydrogeologic conditions over this broad region, the calibrated model is a reasonable tool for estimating probable regional-scale drawdown patterns and trends over time resulting from the various pumping alternatives. Impacts were evaluated in terms of the potential impacts to flows of seeps, springs and streams, potential impacts on water rights, and drawdown effects on subsurface water,

The potential for impacts to individual seeps, springs, or stream reaches depends on:

(1) the source of groundwater that sustains the perennial flow,

(2) the interconnection (or lack of interconnection) between the perennial surface waters and the groundwater aquifers, and

(3) the drawdown that results from the groundwater development.

This evaluation identifies areas where there is likely to be a high or moderate risk of impacts to perennial surface water sources from groundwater development.

The water rights impacts evaluation discloses potential effects to existing surface and groundwater rights resulting from the various proposed pumping alternatives. The assessment was conducted by overlaying maps of the predicted drawdown on the maps of existing water rights. For surface water rights, it was assumed that water rights located within the projected 10-foot drawdown area and located within the identified high and moderate risk areas previously described for perennial water could be affected. It also was assumed that groundwater rights located within the same defined drawdown area could be affected.

The impact evaluation identifies perennial water resources located in areas where there is a high or moderate risk of impacts.

4.3 Where and how large are the areas that would likely experience long-term drawdown effects?

Table ES-10 summarizes the groundwater production rates assumed for the various groundwater development alternatives. Groundwater modeling for the Proposed Action and Alternatives A through E, all show that the drawdown would progressively expand as pumping continues into the future. The alternatives with the highest groundwater withdrawal volumes (Proposed Action and Alternative B) show the greatest drawdown effects; and the alternatives with the lower groundwater withdrawal volume (Alternative C, D and E) show the least drawdown effects.

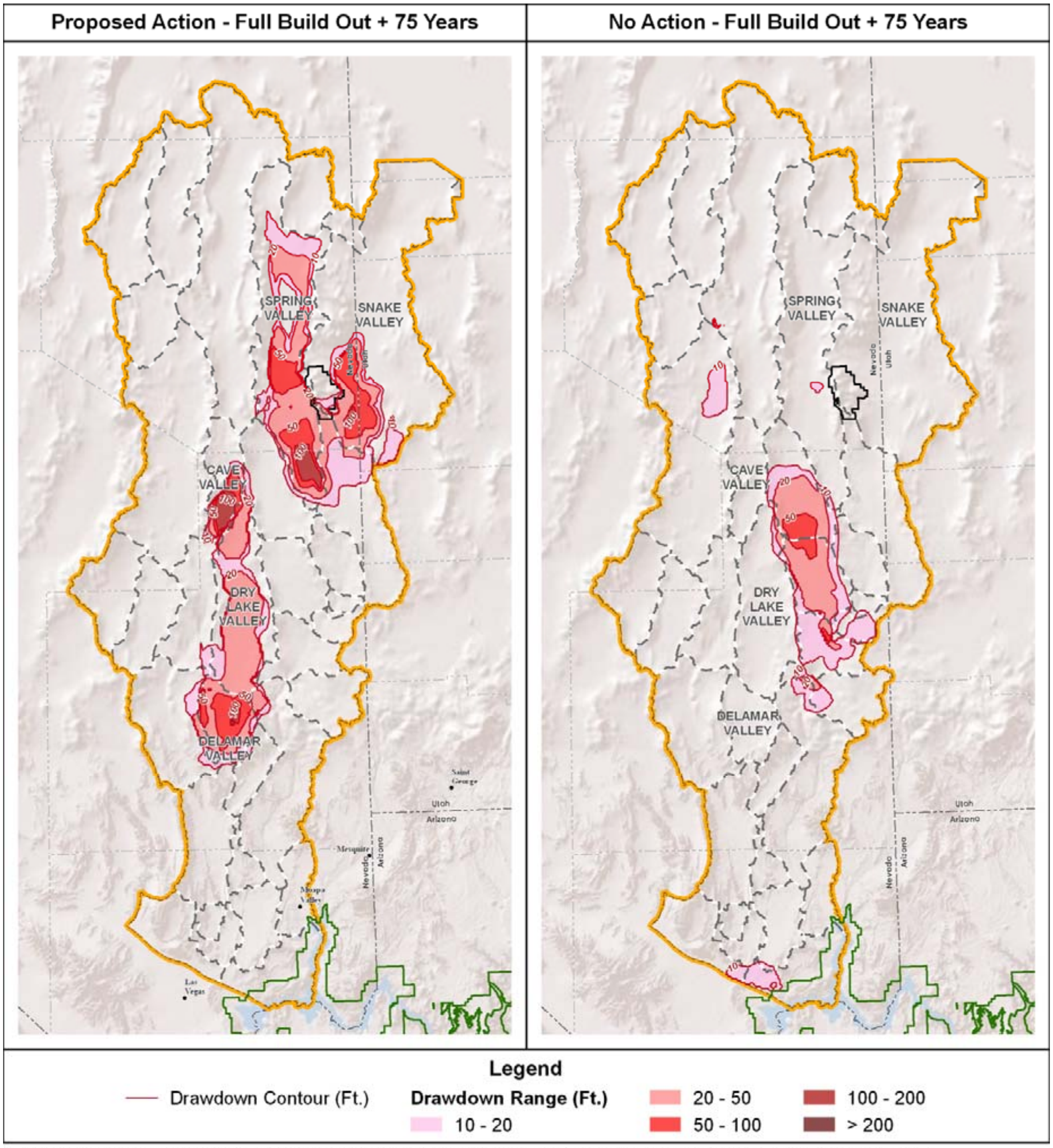
Table ES-10 Summary of Pumping Assumptions for the Alternatives for Analysis

Alternatives for Analysis	SNWA Groundwater Production	Basins in Which SNWA Production Would Occur
Proposed Action	Up to 176,655 afy	Spring, Snake, Cave, Delamar, Dry Lake
A	Up to 114,755 afy	Spring, Snake, Cave, Delamar, Dry Lake
B	Up to 176,655 afy	Spring, Snake, Cave, Delamar, Dry Lake
C	12,000 to 114,755 afy (varies in response to drought)	Spring, Snake, Cave, Delamar, Dry Lake
D	Up to 78,755 afy	South Spring, Cave, Delamar, Dry Lake
E	Up to 78,755 afy	Spring, Cave, Dry Lake, Delamar (No Snake)
No Action	None	None

Section 3.3 and **Appendix F3.3** present extensive discussion and graphical results of the water modeling and effects analytses prepared for the draft EIS. Example outputs from the analysis are presented in a series of side-by-side figures on the following pages.

Section 3.3

Figure ES-14 shows the projected groundwater drawdown effects under the No Action and Proposed Action at full build out plus 75 years. For the No Action Alternative, the groundwater pumping analysis shows the potential future effects from continuing currently existing water uses by agricultural, municipal, mining and milling, industrial, and power plant users. This includes pumping SNWA's existing water rights from its agricultural property in Spring Valley. However, the No Action pumping scenario does not include any groundwater pumping associated with the water rights applications included in the Proposed Action. As shown, drawdown effects occur in northern Lincoln County under the No Action, with some drawdown in excess of 50 feet. The groundwater pumping scenario for the Proposed Action assumes pumping at the full quantities (approximately 177,000 afy) listed on SNWA's pending water rights application for the five proposed pumping basins.

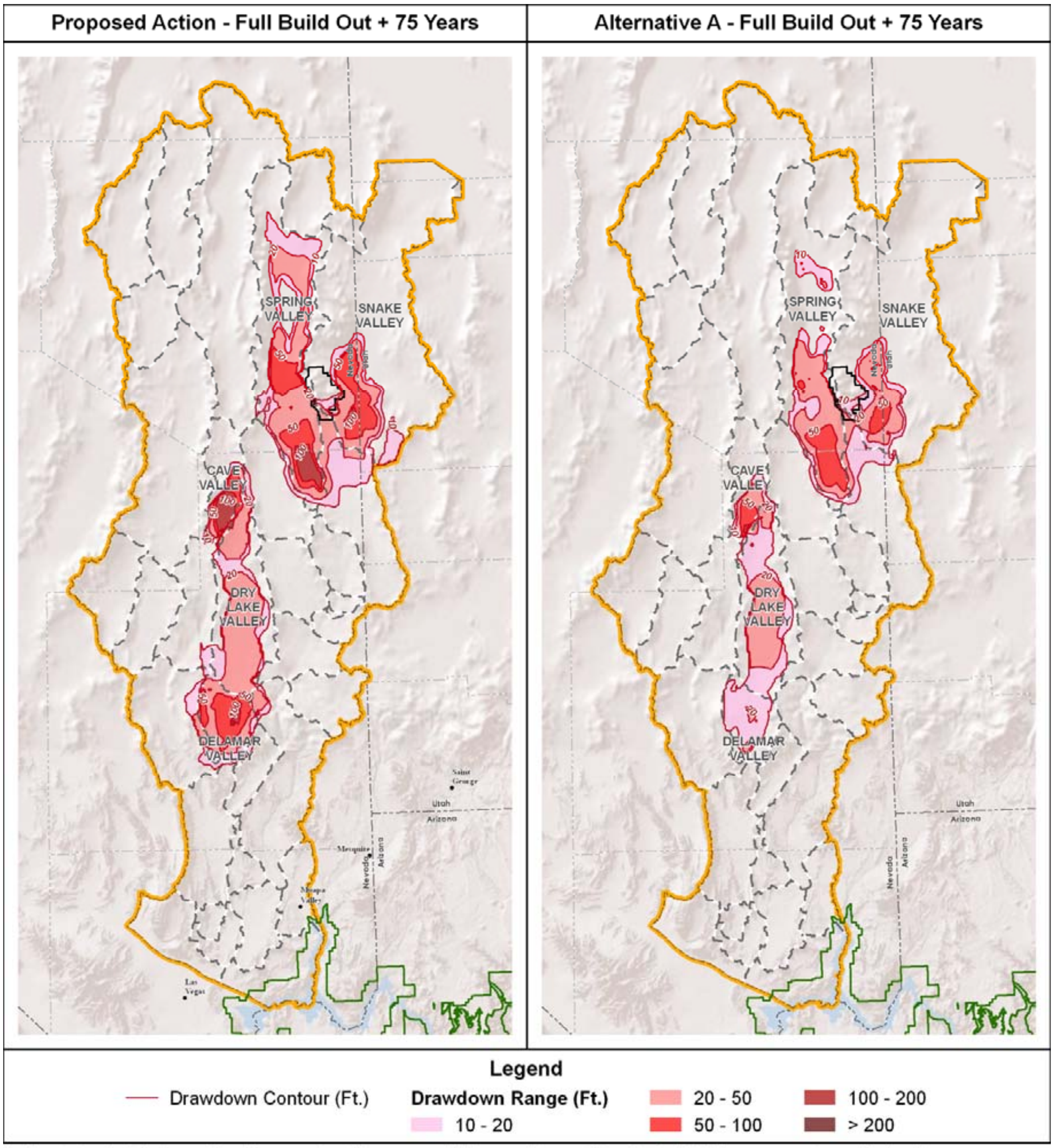


No Warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual use or aggregate use with other data.

Figure ES-14 Model Simulated Drawdown for the Proposed Action and No Action at the Full Build Out Plus 75 Years Time Frame

For the Proposed Action, at the full build out plus 75 year time frame, there are two distinct drawdown areas, with the affected areas separate from those affected under the No Action alternative (**Figure ES-14**). The northern drawdown area encompasses most of the valley floors in Spring Valley, southern Snake Valley, and northern Hamlin Valley. The southern drawdown area extends north-south across the DDC valleys and into the eastern edge of Pahranagat Valley and northwestern edge of Lower Meadow Valley Wash.

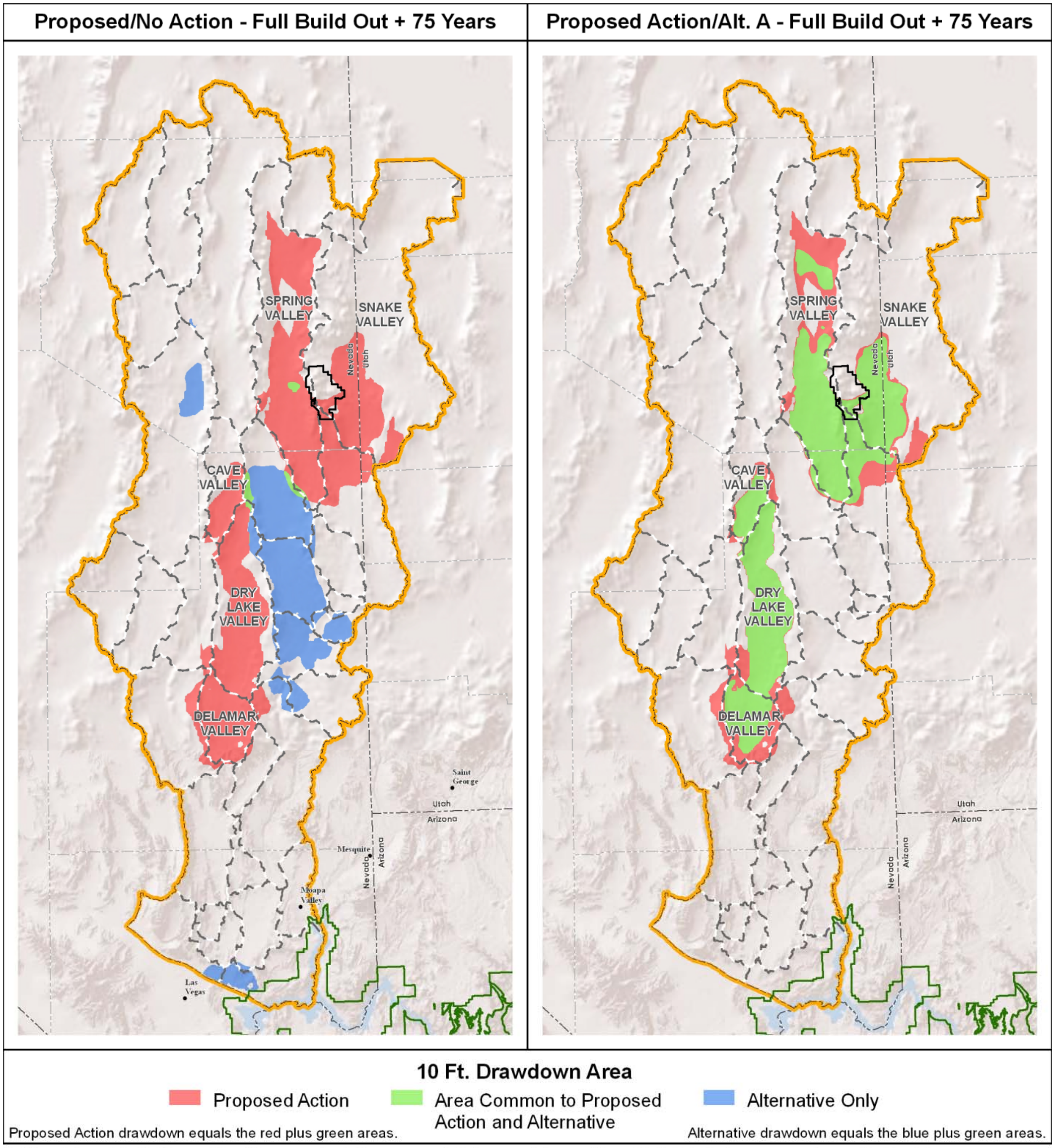
Figure ES-15 shows the areal extent and magnitude of the projected groundwater drawdown effects under the Proposed Action and Alternative A at full build out plus 75 years. Alternative A assumes groundwater pumping at reduced quantities (approximately 115,000 afy) in the five proposed production basins. As shown, the reduced pumping under Alternative A, as compared to the Proposed Action, would reduce the drawdown area particularly in northern Spring Valley, northern Lake Valley, and along the southern edge of the drawdown area.



No Warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual use or aggregate use with other data.

Figure ES-15 Model Simulated Drawdown for the Proposed Action and Alternative A at the Full Build Out Plus 75 Years Time Frame

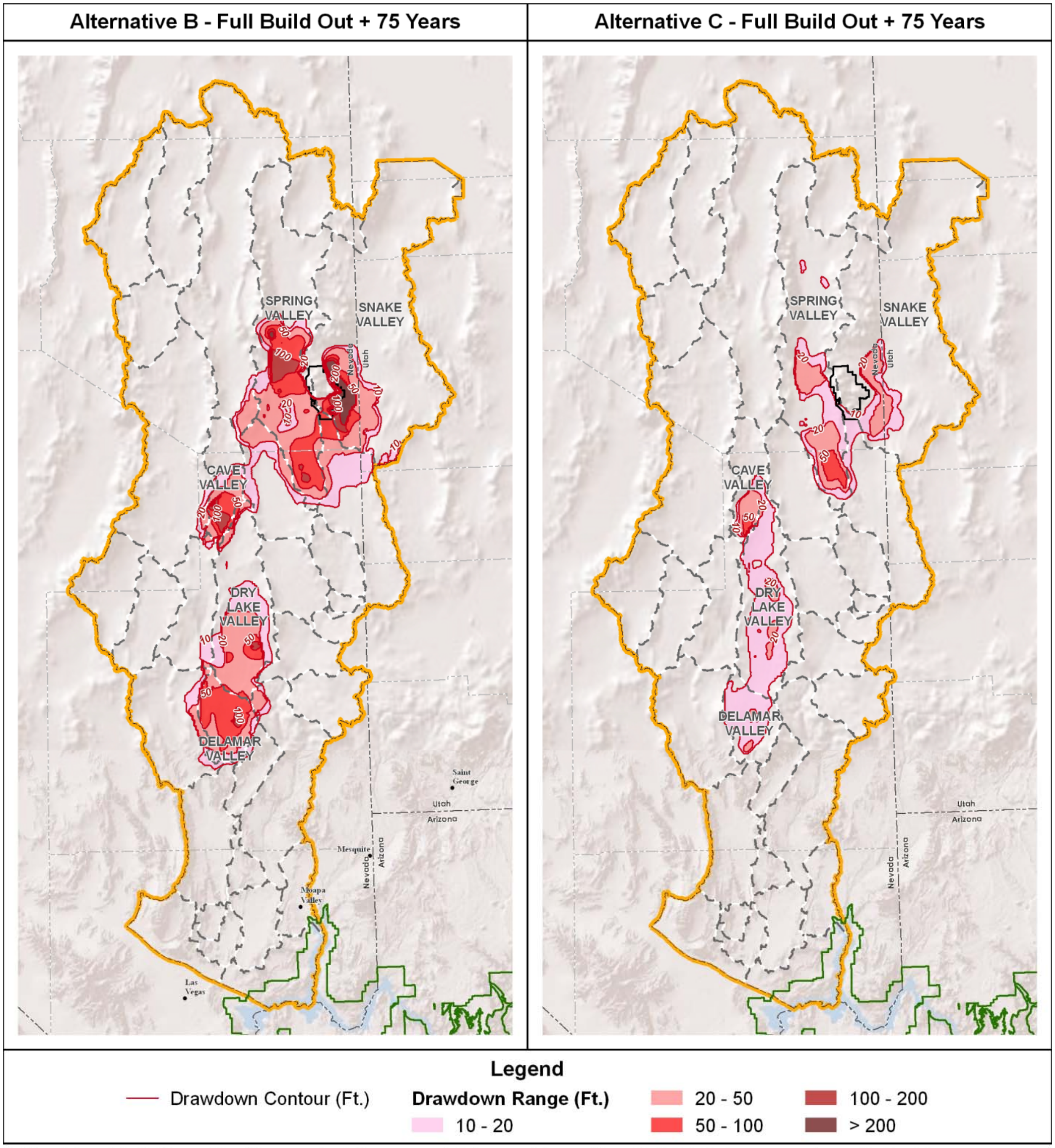
Figure ES-16 presents a different perspective on the projected drawdown area at full build out plus 75 years, showing the overall area projected to be affected by 10-foot or greater drawdown under the No Action and Proposed Action (left panel) and the Proposed Action and Alternative A (right panel). In these figures, the area shaded green represents the affected area under either of the two alternatives, and the reddish/brown area is the incremental area affected by the Proposed Action and the blue area is the area affected by the alternative but not the Proposed Action.



No Warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual use or aggregate use with other data.

Figure ES- 16 Comparative Drawdown Areas, Proposed Action and No Action (Left) and Proposed Action and Alternative A (Right) at the Full Build Out Plus 75 Years Time Frame

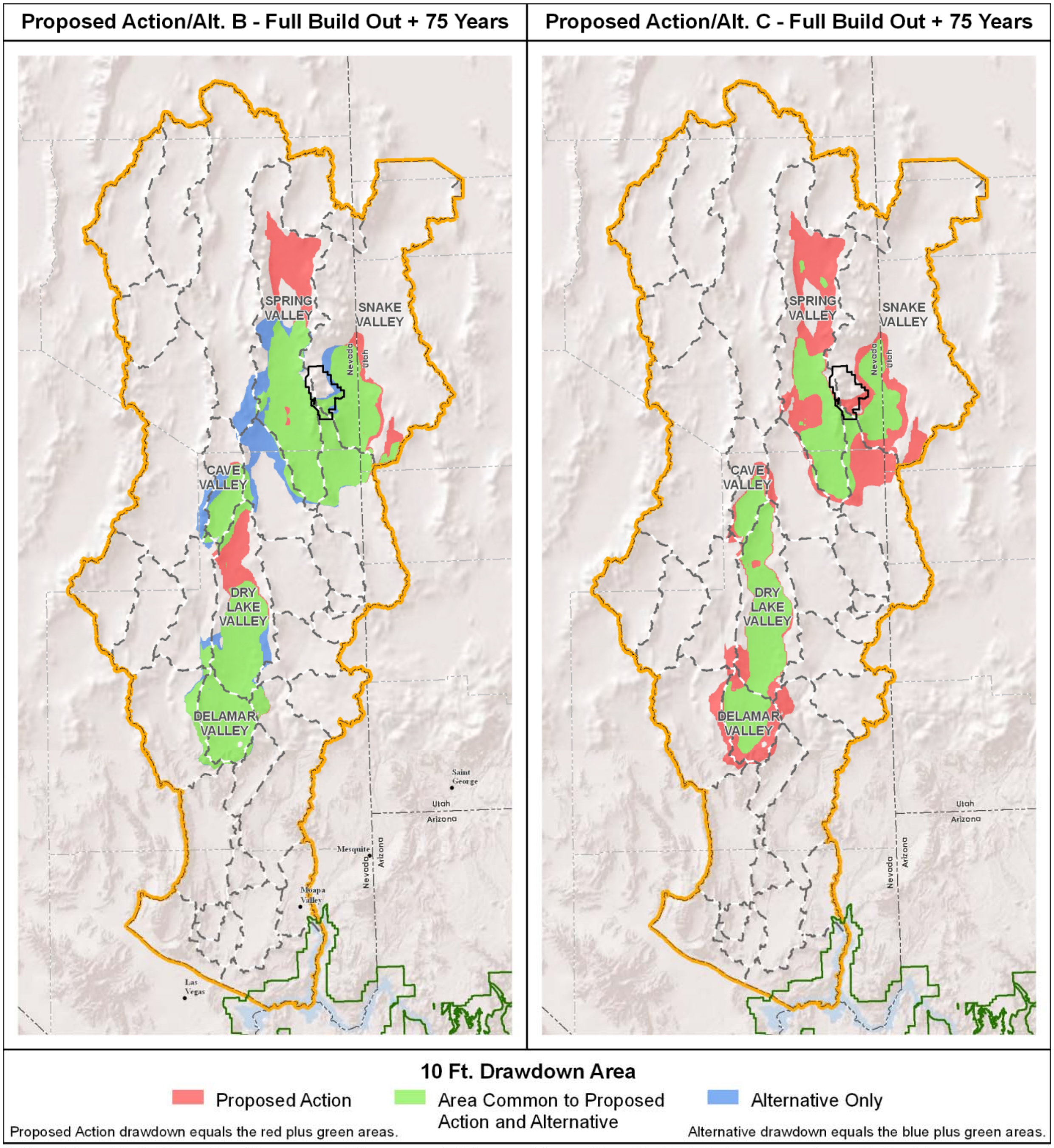
Figure ES-17 shows the areal extent and magnitude of the projected groundwater drawdown effects under the Alternatives B and C at full build out plus 75 years. Alternative B assumes groundwater pumping at the full quantities (i.e., approximately 177,000 afy) listed on the SNWA pending water rights application from the five proposed project pumping basins, assuming that wells would be developed at the actual points of diversion listed on the applications. The Alternative C pumping scenario assumes the same groundwater production wells defined for Alternative A but instead of pumping at a sustained rate (as in Alternative A) pumping rates would cycle from minimum to maximum pumping rates every 5 years, as a way of simulating increased reliance on groundwater during periods of drought.



No Warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual use or aggregate use with other data.

Figure ES-17 Model Simulated Drawdown for Alternative B and Alternative C at the Full Build Out Plus 75 Years Time Frame

Figure ES-18 shows the incremental differences in the projected drawdown area to be affected by 10-foot or greater drawdown at full build out plus 75 years under the Proposed Action and Alternative B (left panel) and the Proposed Action and Alternative C pumping scenarios (right panel).



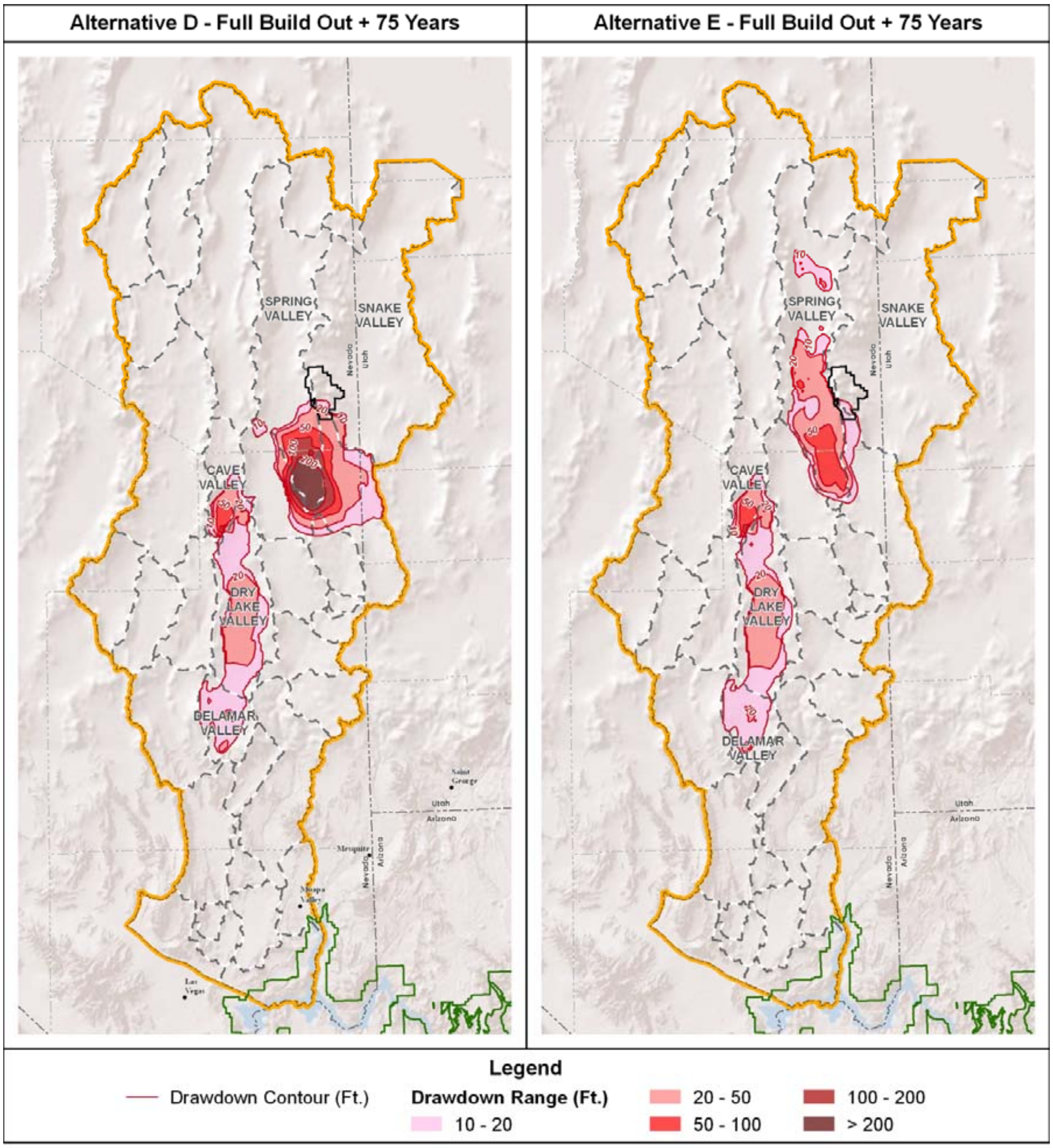
No Warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual use or aggregate use with other data.

Figure ES-18 Comparative Drawdown Areas, Proposed Action and Alternative B (Left) and Proposed Action and Alternative C (Right) at the Full Build Out Plus 75 Years Time Frame

Compared to the Proposed Action, the Alternative B pumping scenario would expand the area of drawdown along the southern edge of Steptoe Valley, in the southern Snake Range between Spring and Snake Valley, and in southern Lake Valley. The drawdown area for Alternative B does not extend into northern Spring Valley or Tippett Valley

(**Figure ES-17**). The model results indicate that the reduction in groundwater withdrawal under Alternative C would further reduce the magnitude of drawdown area compared to the Proposed Action and Alternatives A and B.

Figure ES-19 shows the areal extent and magnitude of the projected groundwater drawdown effects under the Alternatives D and E at full build out plus 75 years. Alternative D assumes no groundwater pumping in Snake Valley, and pumping in Spring Valley restricted to the southern portion of the valley that is in Lincoln County. The maximum groundwater production rate for this alternative is approximately 79,000 afy for the four pumping basins (Spring and DDC valleys) and is the same maximum pumping rate assumed for these basins under Alternatives A, C, and E. The Alternative E pumping scenario includes the same spatial distribution of wells included in Alternative A for Spring, Delamar, Dry Lake, and Cave valleys but assumes no pumping in Snake Valley



No Warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual use or aggregate use with other data.

Figure ES-19 Model Simulated Drawdown for Alternative D and Alternative E at the Full Build Out Plus 75 Years Time Frame

Figure ES-20 shows the incremental differences in the projected drawdown area at full build out plus 75 years, showing the overall area projected to be affected by 10-foot or greater drawdown under the Proposed Action and Alternative D (left panel) and the Proposed Action and Alternative E (right panel).

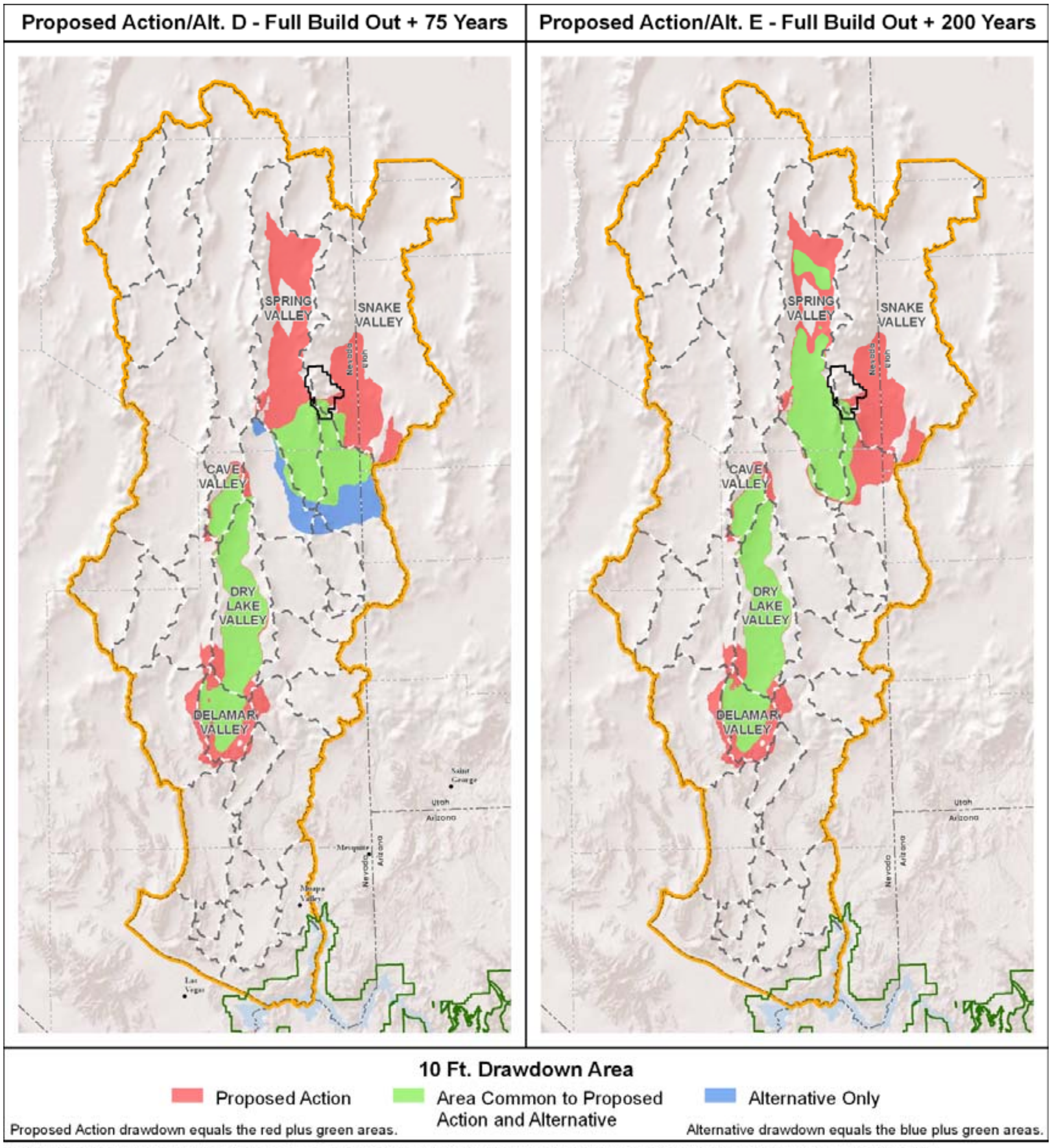
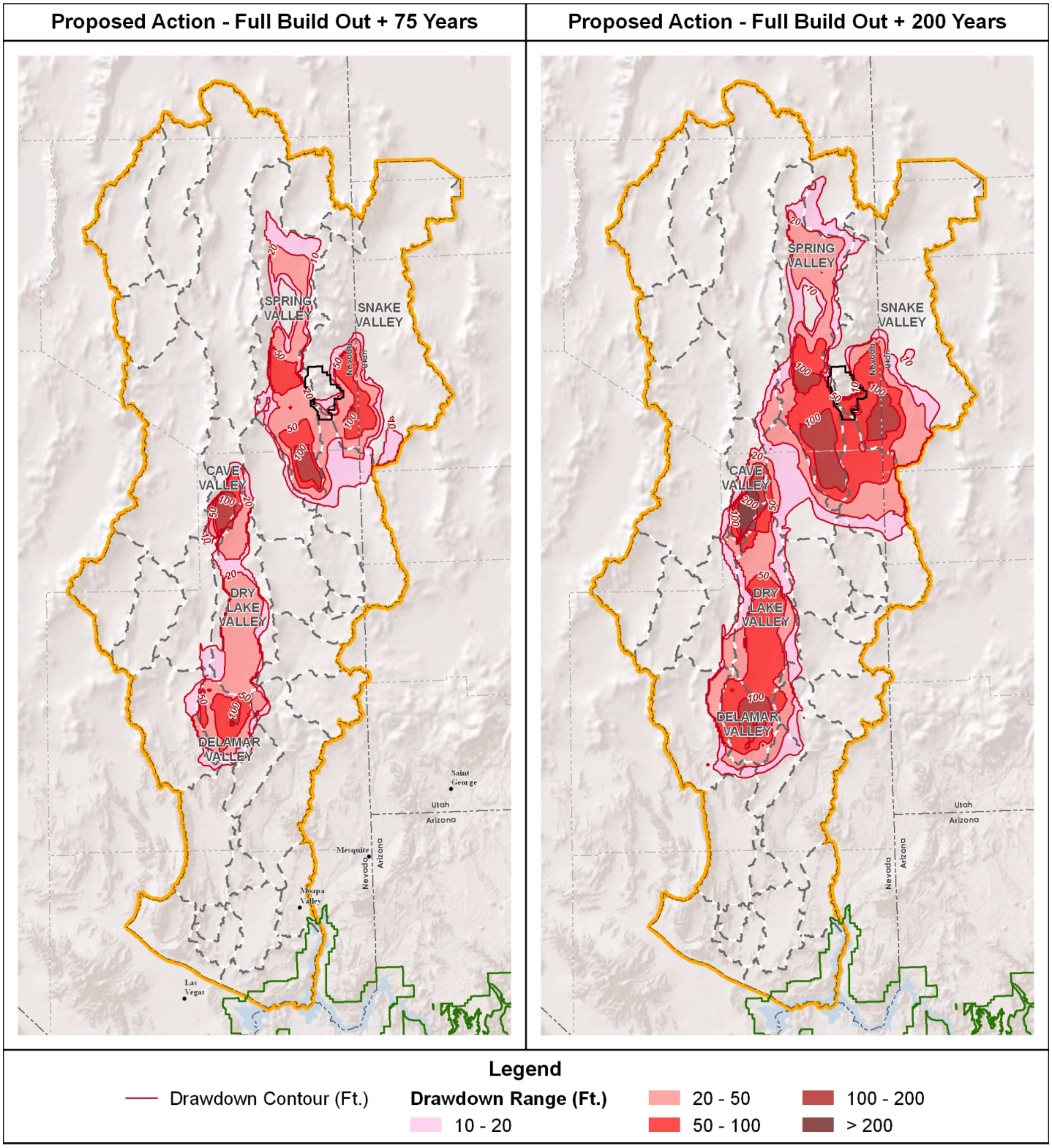


Figure ES-20 Comparative Drawdown Areas, Proposed Action and Alternative D (Left) and Proposed Action and Alternative E (Right) at the Full Build Out Plus 75 Years Time Frame

Compared to the Proposed Action, Alternative D limits drawdown in the central and northern portion of Spring Valley and southern portion of Snake Valley; and expands drawdown in Lake Valley, Hamlin Valley, and into northern Spring Valley. The concentration of pumping wells in southern Spring Valley included in Alternative D results in development of projected drawdowns of greater than 200 feet extending across the entire southern portion of Spring Valley (**Figure ES-19**). Because the pumping schedule for Alternative E is identical to Alternative A for Spring, Delamar, Dry Lake, and Cave Valleys, the predicted drawdown in those valleys (and adjacent areas) are essentially the same as for Alternative A (**Figure ES-15**). This alternative would substantially reduce the drawdown area in Snake Valley compared with the Proposed Action and Alternative A.

4.4 Does the area affected by 10-foot or more of drawdown continue to expand beyond the full build out plus 75 years time frame?

Yes. The groundwater modeling shows continued expansion of the groundwater drawdown area assuming continued pumping beyond full build out plus 75 years. That result applies to all alternatives, including the No Action Alternative. For example, **Figure ES-21** shows the expansion of the model simulated drawdown for the Proposed Action Alternative between the full build out plus 75 years and full build out plus 200 years time frames.



No Warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual use or aggregate use with other data.

Figure ES-21 Model Simulated Drawdown for the Proposed Action at the Full Build Out Plus 75 years and Full Build Out Plus 200 Years Time Frames

4.5 How would long-term pumping affect water resources in the study area?

Table ES-11 provides a comparison of the potential impacts to water resources in the region of study associated with the various alternative pumping scenarios.

Table ES-11 Potential Incremental Effects to Water Resources at the Full Build Out Plus 75 Years and Full Build Out Plus 200 Years Time Frame Resulting from the Alternative Pumping Scenarios[1]

Water Resource Issue	Proposed Action	Alt. A	Alt. B	Alt. C	Alt. D	Alt. E	No Action
Full Build Out Plus 75 Years							
Drawdown effects on perennial springs: • Number of inventoried springs located in areas where impacts to flow could occur[2]	44	29	54	19	13	19	12
Drawdown effects on perennial streams: • Miles of perennial stream located in areas where impacts to flow could occur[2]	80	58	91	37	4	7	19
Drawdown effects on surface water rights: • Number of surface water rights located in areas where impacts to flow could occur[2]	145	109	141	78	23	60	105
Drawdown effects on groundwater rights: • Total groundwater rights in areas with >10 feet of drawdown • Number of groundwater rights in areas with >100 feet of drawdown	199 2	174 0	1184 8	133 0	27 2	70 0	372 0
Percent reduction in groundwater discharge to evapotranspiration: • Spring Valley • Snake Valley • Great Salt Lake Desert Flow System	7% 28% 48%	51% 23% 34%	66% 18% 37%	37% 15% 24%	18% 4% 10%	52% 0% 21%	7% 3% 5%
Full Build Out Plus 200 Years							
Drawdown effects on perennial springs: • Number of inventoried springs located in areas where impacts to flow could occur[2]	57	46	78	26	31	30	20
Drawdown effects on perennial streams: • Miles of perennial stream located in areas where impacts to flow could occur[2]	112	81	120	59	48	23	52
Drawdown effects on surface water rights: • Number of surface water rights located in areas where impacts to flow could occur[2]	212	151	186	98	56	94	164
Drawdown effects on groundwater rights: • Total groundwater rights in areas with >10 feet of drawdown • Number of groundwater rights in areas with >100 feet of drawdown	264 34	223 2	301 45	171 0	213 6	110 2	409 0
Percent reduction in groundwater discharge to evapotranspiration: • Spring Valley • Snake Valley • Great Salt Lake Desert Flow System[1]	84% 33% 54%	57% 27% 39%	73% 24% 44%	37% 17% 25%	28% 8% 16%	56% 3% 24%	7% 3% 5%

[1]Supporting information used to develop these estimated effects are provided in Appendices F3.3.6 through F3.3.16.
[2]Total located in high or moderate risk areas.

Potential Impacts to Springs and Streams

Springs and streams that are controlled by discharge from (or interconnected with) the regional groundwater system and located where a reduction in groundwater levels would occur, would likely experience a reduction in flow. The number of inventoried springs and miles of perennial streams located within the modeled drawdown area and located within areas at moderate to high risk of impacts are shown in **Figures ES-22** and **ES-23**.

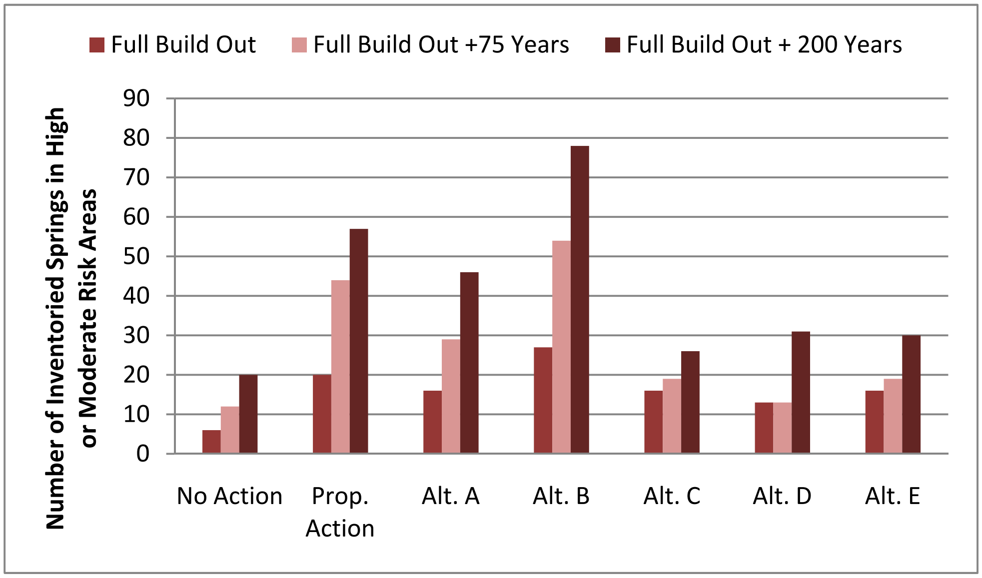


Figure ES-22 Number of Inventoried Springs Located in Areas Where Impacts to Flow Could Occur (High or Moderate Risk Areas)

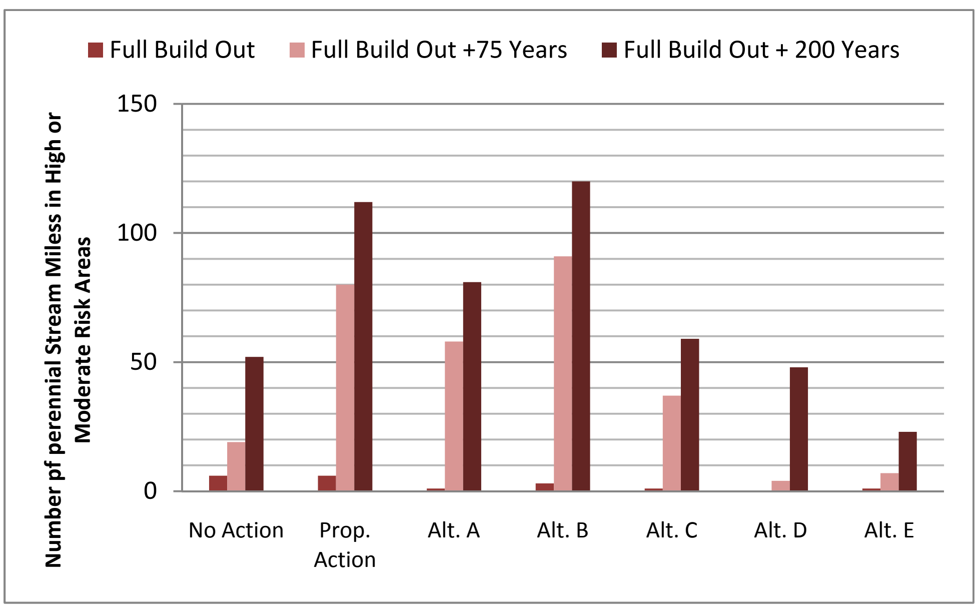


Figure ES-23 Miles of Perennial Streams Located within the Drawdown Area and Areas Where Impacts to Flow Could Occur (High or Moderate Risk Areas)

Under the No Action Alternative pumping scenario, there are 12 inventoried springs at high to moderate risk of being affected at the full build out plus 75 years time frame. The number of springs increases to 20 at the full build out plus 200 year time frame in areas where there is a high to moderate risk of drawdown impacts. The total estimated lengths of perennial streams at high to moderate risk of impacts from the model simulated drawdown increases from about 19 miles at full build out plus 75 years time frame to 52 miles at full build out plus 200 years time frame.

The springs and perennial stream reaches that are at high to moderate risk are identified in:

Section 3.3

The model indicates that continuing the existing pumping under the No Action Alternative would not result in a measurable flow reduction (i.e. >5 percent) in discharge at regional springs in Pahranagat Valley. However, existing pumping in the Muddy River Springs Area, Lower Meadow Valley Wash, and Lower Moapa Valley Hydrologic Basins is predicted to cause a progressive reduction of flow over time in the Muddy River

The simulated drawdown under the Proposed Action and Alternative B, the two alternatives with the largest groundwater withdrawal rate, could potentially impact flows in the largest number of springs and greatest number of miles of perennial stream reach. Compared to the Proposed Action, the reduced drawdown areas resulting from the Alternative A pumping scenario would reduce the number of springs and miles of streams potentially impacted. The Alternative C, D, and E pumping scenarios would further reduce the drawdown area compared to Alternative A, and would potentially impact the fewest number of inventoried springs and fewer miles of perennial stream reach in the region.

Impacts to individual springs and streams would depend on the actual drawdown in these areas and the hydraulic connection between the impacted groundwater systems and the perennial water source. Perennial water sources that are hydraulically connected to the impacted groundwater system in the drawdown area would likely experience a reduction in baseflow that, depending on the severity, could result in springs drying up or a reduction in the length of the perennial stream reaches and their associated riparian areas.

Potential Impacts to Water Rights

The number of surface water rights located in areas where impacts to surface water resources could occur, and the number of groundwater rights located within the areas where the model simulations predict a drawdown of 10 feet or more are listed in **Table ES-11**. There are a large number of existing surface water rights located in areas where impacts from drawdown could occur under both the No Action Alternative and various pumping scenarios. The model indicates that drawdown for the two alternatives with the highest groundwater withdrawal rate (Proposed Action and Alternative B) could impact the largest number of water rights. The reduced drawdown areas under Alternatives A through E would decrease the number of water rights impacted.

The actual impacts to individual surface water rights would depend on the site-specific hydrologic conditions that control surface water discharge. Only the waters that depend on discharge from (or interconnected with) the regional groundwater system that would be affected by pumping would be potentially impacted.

For this evaluation, it is assumed that wells located within the areas affected by drawdown of 10 feet or more could be impacted. Effects on individual wells would depend on the: 1) well construction, including pump setting, depth, yield, predevelopment static and groundwater pumping levels; 2) interconnection between the aquifer where the well is located and the aquifer targeted by the GWD Project; and 3) the magnitude and timing of the drawdown at each location. Impacts to wells could include a reduction in yield, increased pumping cost, or if the water level were lowered below the pump setting or the bottom of the well, the well could be rendered unusable.

Potential Reduction in Groundwater Discharge to Evapotranspiration Areas

Groundwater pumping is anticipated to result in a reduction in the amount of groundwater that discharges to evapotranspiration areas. These evapotranspiration areas are surface areas where water is lost to the atmosphere through evaporation (including evaporation from surface water, soil, or from the capillary fringe of the water table) and through plant transpiration. Reductions in groundwater discharge to evapotranspiration areas would likely affect vegetation resources within these areas.

Potential changes in the water balance for the groundwater system within the region of study were estimated using the groundwater flow model. The estimated reductions in groundwater discharge to evapotranspiration areas for selected basins and flow systems are summarized in **Table ES-11** and illustrated in **Figure ES-24**.

The Proposed Action would result in the largest reductions in groundwater discharge to evapotranspiration areas within Spring and Snake valleys, with estimated reductions of up to 84 percent in such discharge in Spring Valley, and up to 34 percent in Snake Valley. For Snake valley, most of the reductions of discharge to areas would occur in the south portion of the valley. The model results indicate that Alternative D would have the least impact to evapotranspiration areas in Spring Valley because the pumping is concentrated in the south end of the valley away from much of the evapotranspiration areas. However, the concentrated pumping under Alternative D results in the deepest drawdown cone indicating that a higher percentage of the groundwater withdrawn under this scenario is from groundwater storage compared to the other groundwater development alternatives. Alternative E would result in the smallest impacts to evapotranspiration area in Snake Valley. These predicted reductions in evapotranspiration discharge rates indicate that spring discharge within and associated with these evapotranspiration areas would be reduced. Estimates of the potential impacts to vegetation within evapotranspiration areas are summarized under Vegetation Resources (below).

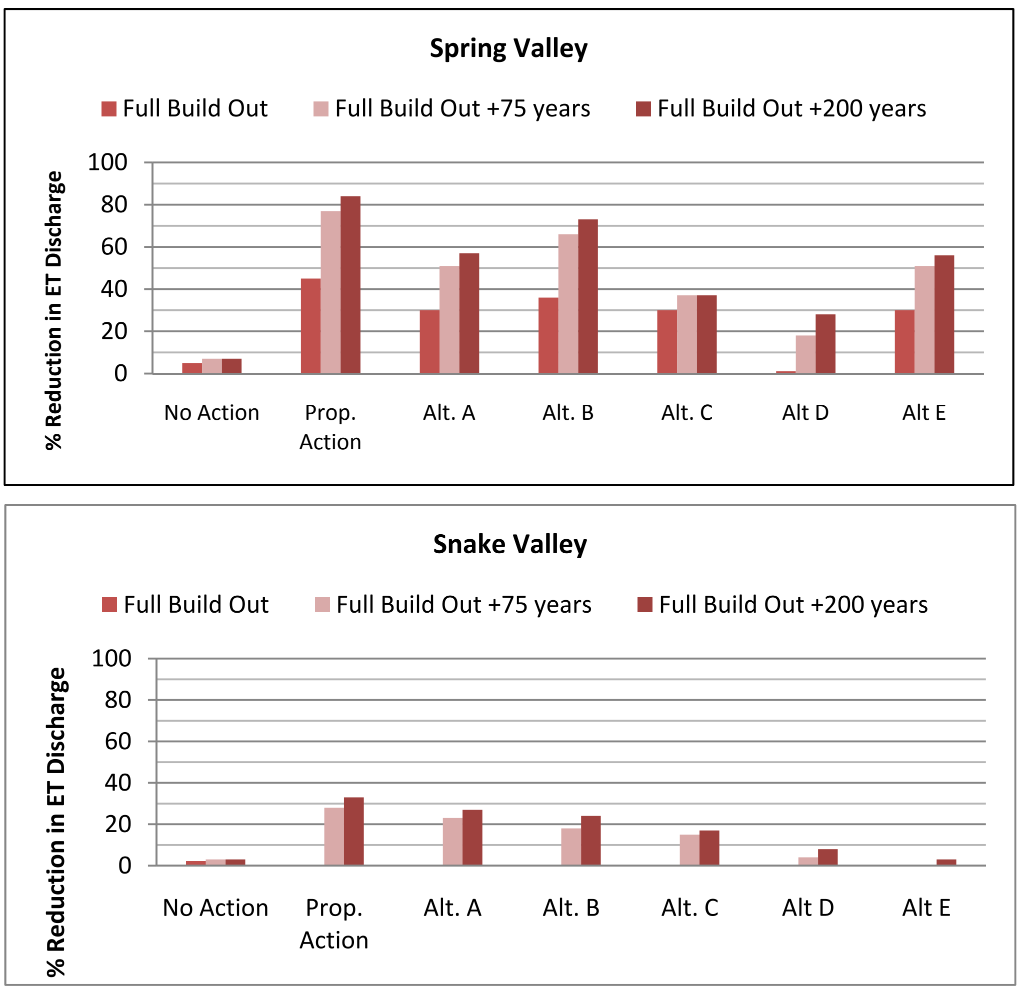


Figure ES-24 Model Simulated Reductions in Groundwater Discharge to Evapotranspiration Areas in Spring and Snake Valleys

4.6 How would long-term pumping affect other resources in the study area?

The effects of groundwater pumping for the Proposed Action, Alternatives A through E, and the No Action for several other key resources are summarized below. For some resources, impact parameter information is used to show the magnitude of effects on the resource. Except for transportation and public safety, the resource effects are directly related to surface water sources such as springs and perennial streams or indirectly linked to water for moisture, plant growth, or habitat (**Figure ES-13**). A comparison of potential effects among alternatives for air resources, geology, soils, vegetation, aquatic biological resources, and land use is provided in **Figures ES-25** through **ES-34**. As shown previously for water resources, these figures illustrate that for all resources, the two alternatives with the largest groundwater withdrawal rate, (Proposed Action and Alternative B) would potentially have the largest effect on these resources. The reduced pumping assumed for Alternative A is estimated to result in a reduction in potential impacts (compared to the Proposed Action and Alternative B) for most of the resources. Groundwater pumping under Alternatives C, D, and E would further reduce potential effects compared to Alternative A. However, the magnitude of the potential reduction in effects for Alternatives C, D, and E varies by resource.

Air Resources

- Groundwater drawdown would likely result in windblown dust emissions due to drying of hydric soils and loss or reduction of basin shrubland vegetation. The estimated particulate matter for a size of 10-micrometer emissions by alternative are shown on **Figure ES-25**. The particulate matter emissions for a size of 2.5 micrometers would show the same pattern of drawdown effects by alternative, although the magnitude would be less than the 10-micrometer size.
- The level and extent of these predicted dust emissions are highly uncertain due to the assumptions involving dust increases from changes in vegetation.

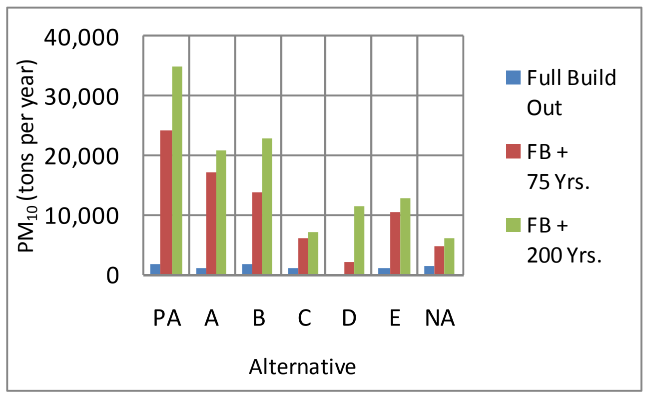


Figure ES-25 Comparison by Alternative of Particulate Matter Emissions Estimated from Groundwater Pumping

- Based on predicted power requirements, indirect emissions of greenhouse gases associated with electricity generation would range from approximately 182,000 (Alternative D) to 327, 000 tonnes (U.S. metric ton) per year (Proposed Action and Alternative C).

Geology

- The major geologic hazard associated with groundwater pumping would be the risk of subsidence of the ground surface as a result of withdrawal of groundwater. A measure of potential subsidence was estimated based on model-simulated drawdowns and the assumption that every 20 feet of drawdown could result in 1 foot of surface subsidence. (**Figure ES-26**) illustrates the estimated area that could potentially experience subsidence of 5 feet or greater for each alternative. Predictions for subsidence for Alternative B are especially high because pumping would occur at a small number of points of diversion, resulting in deep aquifer drawdowns in Spring and Snake Valleys, with consequent risks of subsidence.

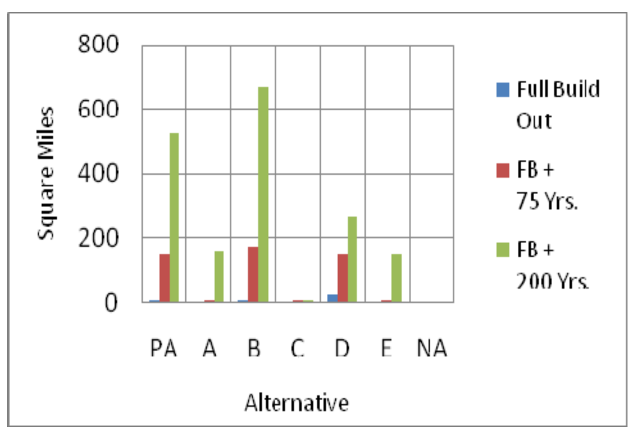


Figure ES-26 Comparison by Alternative of Areas at Risk of Subsidence > 5 Feet from Drawdown

- There is a lack of data on water resources and hydrological linkages of cave systems to groundwater to make conclusions regarding cave susceptibility to groundwater pumping.

Soils

- Reductions in groundwater levels and input from surface flows could reduce the area and functionality of hydric soils to support wetland and other water-dependent vegetation for all pumping alternatives. The magnitude of effects on acres of hydric soils are shown in **Figure ES-27**.

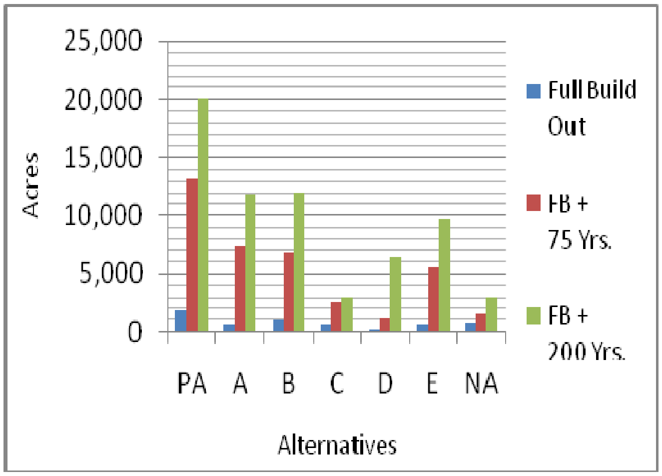


Figure ES-27 Hydric Soil Acres at Risk from Drawdown (≥ 10 feet)

Vegetation

- Groundwater pumping would potentially reduce available moisture in the root zones of vegetation communities that transpire (evaporate) large quantities of soil water through plant leaves. The Wetland/Meadow and Basin Shrubland vegetation are the primary sources of transpiration water from the hydrographic basins to be developed by the GWD Project.
- The Wetland/Meadow cover type depends on shallow groundwater (generally 10 feet or less) and surface flows, and are often supported from surface and subsurface flows from springs, and other areas of shallow groundwater. This cover type occupies relatively small areas in Spring, Snake, and Lake Valleys.
- The Basin Shrubland cover type consists of a variety of shrub species, with greasewood (*Sarcobatus vermiculatus*) the most abundant. Greasewood and some other species of shrubs can extend their root systems to depths of 50 feet take advantage of both shallow and deep groundwater. The Basin Shrubland cover type occupies very large areas across basin floors in Spring, Snake, Lake, and Hamlin Valleys.
- Based on drawdown effect studies in other desert basins, it is anticipated that groundwater drawdown of 10 feet or more would result in the drying out, and then conversion of Wetland/Meadow cover types to upland shrub-dominated areas. It is anticipated that the greatest risk of compositional change to these communities would occur under the Proposed Action, and Alternatives A and B in Spring and Snake Valleys (**Figure ES-28**).
- It is anticipated that the Basin Shrubland cover type would retain its dominant shrubs, but shrub densities may decline, and there is a risk of invasion by invasive annual species. The overall risk of wildland fires would increase in areas dominated by annual species. The alternatives and valleys where there would be a risk of compositional change would be the same as for the Wetland/Meadow cover type (**Figure ES-29**).
- Groundwater drawdown may affect spring and stream flows, which in turn may affect water availability to riparian shrubs, grasses, and herbs. These vegetation communities may become less vigorous or extensive under decreased spring and stream flow over time. The relative drawdown effects of various alternatives to spring and stream dependent vegetation are indicated by the Aquatic Biological Resource figures in the next section.
- The vegetation community compositional changes identified above may affect the availability and extent of tribal traditional use plants in the hydrographic basins affected by the GWD Project.

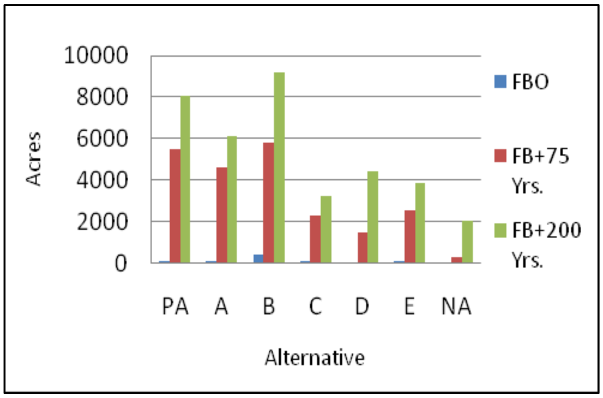


Figure ES-28 Wetland/Meadow Acres at Risk from Drawdown (≥ 10 feet)

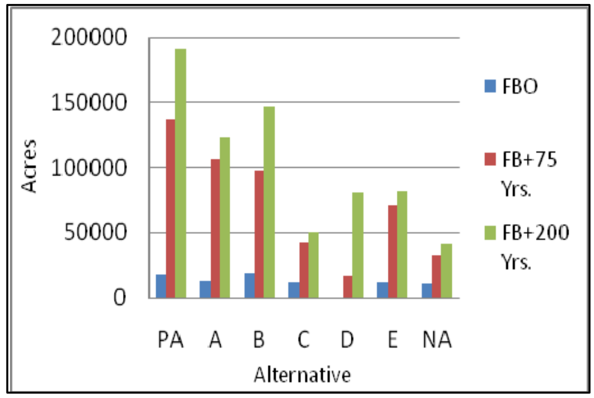


Figure ES-29 Basin Shrub Acres At Risk from Drawdown (≥10 feet)

- Plant species in vegetation communities that are directly dependent on perennial spring and stream flows would experience the greatest potential change in plant species composition. Under drawdown conditions, wetland communities consisting of sedges, rushes, and cattails would progressively change toward a community dominated by deep-rooted grasses. The overall surface area occupied by wetland species would decrease, with persistence only in areas that continue to receive sufficient surface and groundwater for long-term survival. Dominant phreatophytic shrubs would likely persist over the long term, but potentially at lower densities and vigor as the result of reduced availability of soil moisture at greater depths, and lower suitability for shrub seedling re-establishment and growth.

Aquatic Biological Resources

- Spring, pond, lake, and perennial stream habitats located within the 10-foot drawdown contour and characterized as having moderate or high risks of flow reductions could be adversely affected by pumping from all alternatives. The number of affected waterbodies would vary by alternative, as indicated below in the spring and stream figures. Game fish, native fish, special status species and other aquatic species would be adversely affected by flow reductions.
- Flow reductions would modify habitat by decreasing depths, water velocities, and wetted area in spring/pond/lake and stream habitats. A complete loss of habitat and species could occur in small springs and larger springs where all or most of the flow input is affected. Flow reductions could adversely affect aquatic species by reducing abundance and diversity, altering composition, reducing food sources, limiting spawning or early life stage development, and decreasing overall health condition.

Impact differences among the alternatives at the three model time frames are shown in **Figures ES-30** through **ES-33** for some of the key impact parameters.

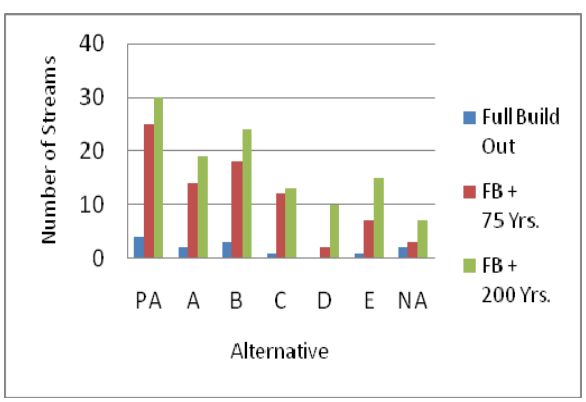


Figure ES-30 Streams with Aquatic Biology Resources with Potential Flow Reductions

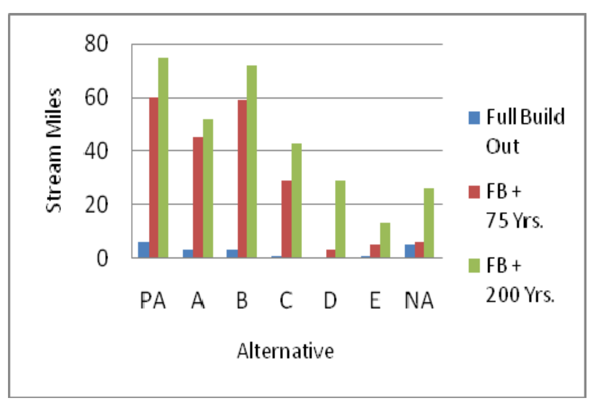


Figure ES-31 Miles of Game Fish and Special Status Species Streams with Potential Flow Reductions

- Pumping by all alternatives could adversely affect two federally listed fish (Pahrump poolfish and White River spinedace), northern leopard frog, and special status fish and invertebrate species (springsnails and freshwater mussel, California floater). Pumping by all alternatives would conflict with recovery or conservation management objectives for the two federally listed species, northern leopard frog, and Bonneville cutthroat trout.
- Fish species considered to be traditional values to regional Tribes could be affected in Snake, Spring, and Lake valleys to varying degrees by the pumping alternatives.

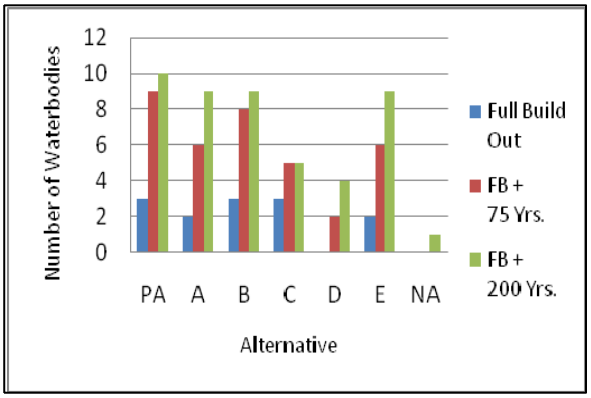


Figure ES-32 Springs/Ponds/Lakes Containing Special Status Amphibian Species with Potential Flow Reductions

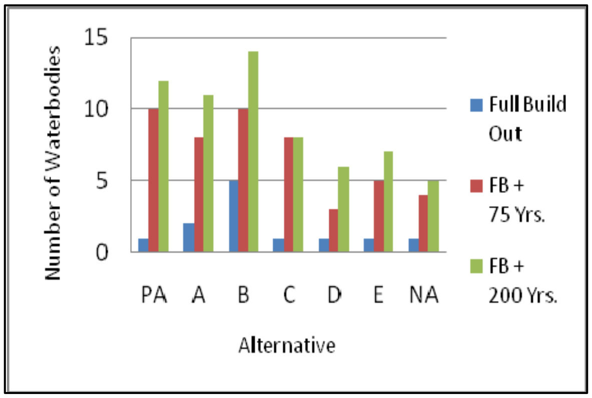


Figure ES-33 Springs/Ponds/Lakes Containing Game Fish and Special Status Species with Potential Flow Reductions

Land Use

- Groundwater pumping would result in the drawdown of groundwater levels on public lands that are available for disposal and private agricultural lands. The magnitude of effects on these two land use parameters are shown below (**Figures ES-34** and **ES-35**).

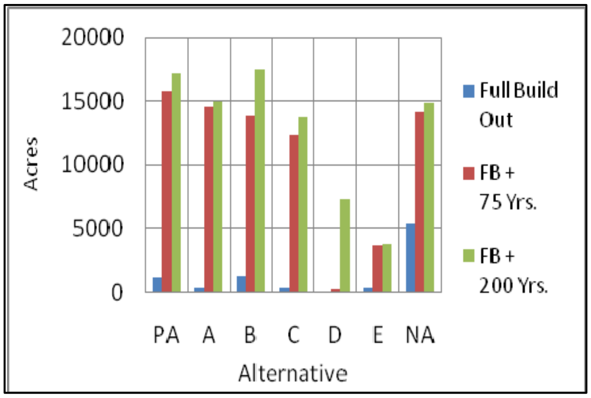


Figure ES-34 Private Agricultural Lands (Acres) At Risk from Drawdown

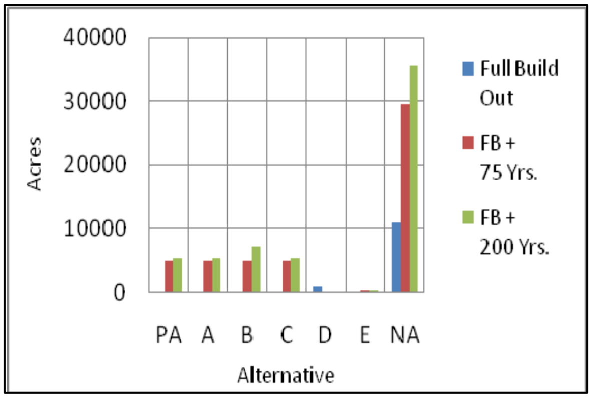


Figure ES-35 Land Available for Disposal (acres) At Risk from Drawdown

- Lands available for disposal would be affected in Panaca, Spring, and Snake valleys by the No Action, with little influence from GWD Project operations. Agricultural lands could be affected in Spring, Snake, and Lake valleys by GWD Project operations.

Wildlife

- Reductions in groundwater levels and input to surface flows would affect wildlife habitats such as springs, perennial streams, wetland/meadow, and basin shrublands for all pumping alternatives. The potential reduction or loss of these habitats would result in reduction or loss of cover, breeding sites, foraging areas, and changes in both plant and animal community structure. The degree of impacts to wildlife resources would depend on a number of variables such as the existing habitat values and level of use, species' sensitivity to the water-dependent habitats, and the magnitude of the habitat reduction. Species groups with potential adverse effects would include big game, small and large mammals, upland game birds, waterfowl, nongame birds, bats, reptiles, and invertebrates.

- Pumping by all alternatives could adversely affect three federally listed birds (southwestern willow flycatcher and yellow-billed cuckoo), greater sage-grouse (federal candidate), and other special status bird and bat species, pygmy rabbit, and invertebrates. Pumping by all alternatives could conflict with recovery or conservation management objectives for the federally listed species.
- The relative effects of pumping alternatives on wildlife habitat is indicated in the figures for springs and streams under Water Resources and wet meadow and shrubland evapotranspiration values under Vegetation.

Recreation

- Groundwater pumping could result in flow reductions in perennial streams, springs, and ponds and alter wetland meadow and basin shrubland vegetation, which could change the recreation setting, wildlife use patterns, fish abundance, and recreation use of these resources.
- The number of recreation areas where surface and groundwater sources could be affected by pumping would include for the Proposed Action and Alternative B, three for Alternatives A and C, and two for Alternatives D and E. The four recreation areas are the Great Basin National Park, Loneliest Highway Special Recreational Management Area, Pioche Special Recreational Permit, and North Delamar Special Recreational Management Area.

Rangelands and Grazing

- Reductions in groundwater levels and input to surface flows would affect water sources (springs and perennial streams) and alter forage vegetation (wetland meadow and basin shrubland) within grazing allotments. The pattern of effects by alternatives would be the same as shown in figures for water resources and vegetation.
- The capacity of habitat within grazing allotments to sustain livestock includes consideration of adequate forage, water, space, and cover. Reduced stream and spring flows could adversely affect forage production on a given allotment and cause overgrazing near existing water sources.

Wild Horses

- The capacity of habitat within wild horse herd areas includes consideration of adequate forage, water, space, and cover. Water is a limiting factor in some herd management areas. Reduced stream and spring flows could adversely affect forage production on a given Herd Management Area and cause overgrazing near existing water sources.
- Reductions in groundwater levels and input to surface flows would affect water sources (springs and perennial streams) and alter forage vegetation (wetland meadow and basin shrubland) within wild horse management areas. The pattern of effects by alternatives would be the same as shown in figures for water resources and vegetation.

Visual Resources

- Groundwater pumping potentially could reduce soil moisture and stress wetland meadow and basin shrubland vegetation. These changes in vegetation communities could gradually change the scenic views in terms of color, texture, density, and vegetation patterns. The pattern of effects for each of the alternatives is shown in the vegetation figures.

Special Designations

- Water level reductions in the Baking Powder Flat, Shoshone Ponds, and Lower Meadow Valley Wash Area of Critical Environmental Concern could adversely affect the resources being protected by the Area of Critical Environmental Concern designation and potentially compromise the objective of the designation.
- Although drawdown could affect some water-dependent resources within the Pahranagat National Wildlife Refuge and the High Schells and Mount Grafton Wilderness Areas, drawdown effects are not expected to compromise the objectives of these special designated areas.

- Groundwater pumping could result in flow reductions in springs, ponds, and perennial streams and alter vegetation (stream riparian areas and associated wetlands) within special designation areas and Great Basin National Park. The number of special designation areas potentially affected by the alternatives would be three for all alternatives except Alternative D with one affected area. The pattern of effects by alternatives would be the same as shown in figures for vegetation.

Cultural Resources

- Groundwater pumping by all alternatives could result in impacts to subsurface archaeological sites. The extent and significance of these potential impacts are difficult to define and quantify given the lack of specific location information for buried sites.
- Potential subsidence effects associated with drawdown could contribute to the integrity of standing structures.

Native American Traditional Values

- Groundwater pumping by all alternatives would result in flow reductions in springs and perennial springs that the associated plant, wildlife, and fish values within Native American lands. The pattern of effects by alternatives would be the same as shown in figures for water resources.

Socioeconomics

- Potential social and economic impacts related to the pumping effects are inherently long-term, materializing over time as pumping and groundwater drawdown continue, and tend to be positively correlated with the volume of pumping and drawdown.
- Because they affect human populations, risk, uncertainty, and the likelihood that some effects of drawdown may not be reversible are themselves dimensions of project-related impacts to social and economic conditions in the rural areas of the region.
- Drawdown poses long-term risks to the agricultural sector in the rural areas through potential effects on grazing, irrigation and well development costs, and streams and seeps that serve as livestock water supplies.
- Groundwater production and conveyance would generate interbasin water transfer fees in White Pine and Lincoln counties which must be used for economic development, health care and education.
- Residents of the rural area express concern about potential long-term indirect socioeconomic effects could result from impacts on wildlife, rangeland, air quality and visibility, and long-term economic development.
- The onset of groundwater pumping would cause increasing distress for many residents of the rural area; stemming from their perceptions of risks to the local environment and concern for detrimental long-term effects on their health, quality of life and livelihoods, and those of successive generations. For some residents, particularly in Snake and Spring Valleys, personal distress would stem from the risk of loss of a valued rural way of life.
- The potential for adverse social and economic effects in the Snake Valley would be avoided under Alternatives D and E. Alternative D would also reduce such effects in northern Spring Valley.
- The availability of groundwater in Clark and Lincoln counties, conveyed by the pipeline and facilities associated with the Proposed Action and other action alternatives, could, in combination with other factors, enable a portion of the growth anticipated by those two counties, but only if other necessary underlying economic and environmental factors to stimulate growth are in place. Water availability would not be a driving force for growth.
- For some Las Vegas Valley residents, organizations, community and political leaders, and development interests, initiation of groundwater pumping may provide a measure of assurance that additional water will be available to enable growth in the Las Vegas Valley and provide a buffer against future water shortages due to episodic drought or climate change.

5. Cumulative Groundwater Drawdown Impacts

The hydrologic study area for cumulative impacts from groundwater withdrawal encompasses the 35 hydrographic basin regions included in the model that was developed to evaluate the potential effects of the GWD Project (**Figure ES-36**). The groundwater model also was used to evaluate the potential cumulative effects assuming continuation of existing pumping; project-related pumping; and reasonably foreseeable future pumping in the region over the same time period as the project-related pumping, that is, full build out plus 200 years.

5.1 What level of cumulative groundwater pumping is assumed for this EIS?

The cumulative analysis of groundwater drawdown effects is based on the results of groundwater model simulations. The past and present actions reflect the best available information on consumptive uses in the groundwater basins included in the model. The reasonably foreseeable projects were those that were known at the time the modeling simulations were conducted.

The pumping scenarios were developed to simulate the combined effects associated with (1) the continuation of existing pumping in the region included under the No Action pumping scenario; (2) additional pumping associated with the proposed groundwater development project, or alternative groundwater development scenarios (i.e., Alternatives A through E); and (3) additional reasonably foreseeable groundwater developments that have been identified within the cumulative study area.

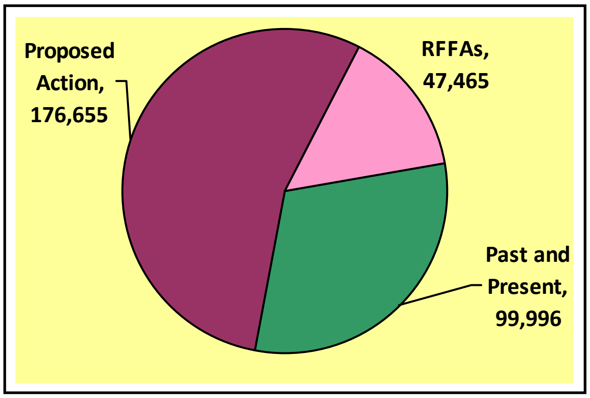


Figure ES-36 Cumulative Groundwater Development (afy)

Figure ES-36 summarizes the total cumulative groundwater consumptive use for the hydrologic basins within the overall hydrologic region of study included under the Proposed Action cumulative effects analysis. The Proposed Action represents the GWD Project alternative with the maximum potential groundwater withdrawal from the five project basins. No past or current pumping is occurring in Cave, Delamar, and Dry Lake valleys. Little or no incremental change in pumping is foreseeable in the five project basins. Based on these estimates, the GWD Project would be the primary groundwater user in all five groundwater development proposed pumping basins.

As discussed earlier, site-specific NEPA analysis will be conducted for the various groundwater development basins. Therefore, the cumulative analysis will be reviewed and updated as necessary during subsequent NEPA analyses.

5.2 What are the potential cumulative drawdown effects to water resources?

The potential cumulative drawdown effects were evaluated using results of the groundwater modeling over the same time frame as the project-related pumping, that is, full build out plus 200 years. The effects are summarized below.

No Action Alternative Cumulative Pumping. The predicted changes in groundwater levels attributable to the No Action Alternative cumulative pumping results in the development of new or expanded drawdowns in the Steptoe, Clover, Kane Springs, and Coyote Springs valleys. The model indicates that pumping under the No Action Alternative cumulative scenario does not substantially contribute to drawdowns in Spring and Snake Valleys.

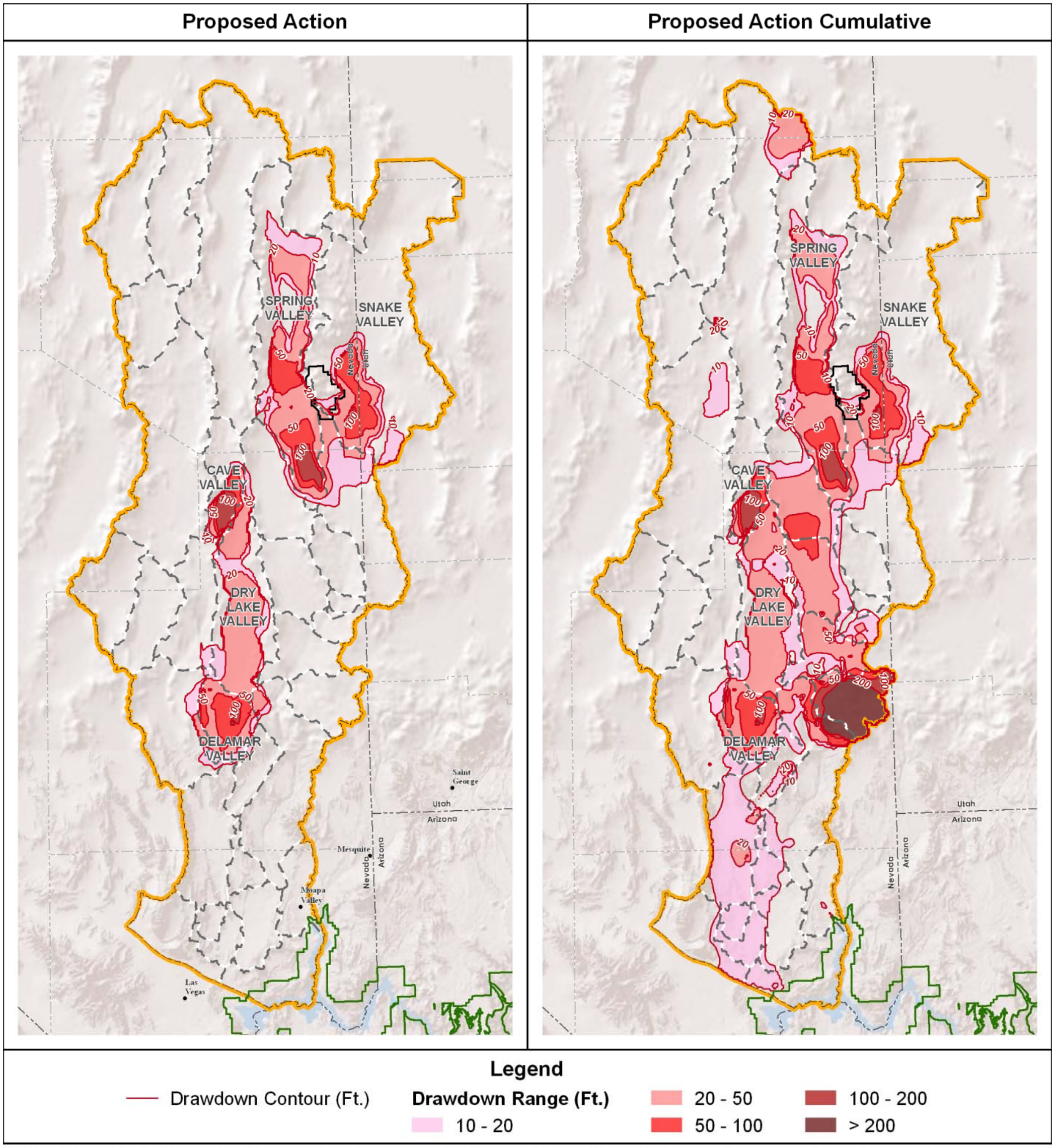
Groundwater Development Pumping Scenarios. The cumulative drawdown predicted for each of the six groundwater development pumping alternatives (Proposed Action and Alternatives A through E) reflect the combined effects associated with the No Action Alternative cumulative drawdown and the incremental effects attributable to the groundwater pumping under the specific alternative described previously.

The Proposed Action provides an example of the maximum cumulative drawdown predicted for the six groundwater development scenarios (**Figure ES-37**). Comparison of the No Action Alternative scenario with the six project alternative scenarios results in the following observations.

- Spring and Snake Valleys: The continuation of existing pumping and reasonably foreseeable pumping is not expected to substantially increase drawdown effects over those for the project specific effects.
- White River, Cave, Dry Lake, and Lake Valleys: Predicted drawdown from project pumping would overlap with the drawdown for the No Action Alternative in Lake Valley and adjacent areas. The overlapping drawdown effects from the proposed project pumping and existing pumping in Lake Valley would increase drawdown in Lake Valley and in Cave and Dry Lake valleys. The proposed groundwater development is predicted to contribute to a reduction in flow to springs located near the eastern margin of the valley floor in the southern portion of White River Valley.
- Delamar Valley, Lower Meadow Valley Wash, and Clover Valley: The proposed groundwater development is not anticipated to contribute to additional drawdown in Clover Valley. However, the overlapping drawdown from pumping in Clover Valley and Delamar Valley is predicted to increase drawdown in the northern portion of the Lower Meadow Valley Wash.
- Coyote Spring, Muddy River Springs, Hidden Valley North, Garnet Valley, Black Mountain Area, and Las Vegas Valley: The drawdown effects in these basins are essentially the same under both the No Action Alternative cumulative and the project related cumulative scenarios. The incremental drawdown attributable to project pumping is not anticipated to substantially contribute to drawdowns beyond those simulated for the No Action Alternative in Coyote Spring, Muddy River Springs, Hidden Valley North, Garnet Valley, Black Mountain Area, and Las Vegas Valley.

These observations generally apply to all six alternative cumulative pumping scenarios unless otherwise noted. However, the alternatives with the highest groundwater withdrawal volumes (Proposed Action and Alternative B) show the largest overlapping drawdown effects; and the alternative with the lowest groundwater withdrawal volume (Alternative C) show the smallest amount of overlapping drawdown effects.

Potential effects to water resources resulting from the cumulative pumping scenario at the full build out plus 75 years and full build out plus 200 years time frame are summarized in **Table ES-12**. The following discussion provides a summary of potential major effects and compares the results for the alternative pumping scenarios.



No Warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual use or aggregate use with other data.

Figure ES-37 Drawdown Area Proposed Action at Full Build Out Plus 75 years and Proposed Action Cumulative at Full Build Out Plus 75 years

Table ES-12 Comparison of Potential Cumulative Effects to Water Resources at the Time Frames Associated with Full Build Out Plus 75 and Full Build Out Plus 200 Years[1]

Water Resource Issue	Proposed Action	Alt. A	Alt. B	Alt. C	Alt. D	Alt. E	No Action
Full Build Out Plus 75 Years							
Drawdown effects on perennial springs:							
• Number of inventoried springs located in areas where impacts to flow could occur[2]	65	53	77	42	34	42	19
Drawdown effects on perennial streams:							
• Miles of perennial stream located in areas where impacts to flow could occur[2]	131	110	137	98	53	56	42
Drawdown effects on surface water rights:							
• Number of surface water rights located in areas where impacts to flow could occur[2]	305	274	299	257	198	224	159
Drawdown effects on groundwater rights:							
• Total groundwater rights in areas with >10 feet of drawdown	683	667	679	635	541	558	500
• Number of groundwater rights in areas with >100 feet of drawdown	21	19	27	19	21	19	19
Percent reduction in evapotranspiration and spring discharge:							
• Spring Valley	78%	55%	69%	43%	24%	55%	6%
• Snake Valley	30%	25%	21%	17%	7%	4%	2%
• Great Salt Lake Desert Flow System[1]	50%	38%	41%	28%	14%	25%	4%
Full Build Out Plus 200 Years							
Drawdown effects on perennial springs:							
• Number of inventoried springs located in areas where impacts to flow could occur[2]	82	74	102	63	53	62	28
Drawdown effects on perennial streams:							
• Miles of perennial stream located in areas where impacts to flow could occur[2]	193	166	2001	151	119	120	79
Drawdown effects on surface water rights:							
• Number of surface water rights located in areas where impacts to flow could occur[2]	422	372	393	341	302	315	
Drawdown effects on groundwater rights:							
• Total groundwater rights in areas with >10 feet of drawdown	783	752	754	730	672	642	555
• Number of groundwater rights in areas with >100 feet of drawdown	181	76	171	66	139	76	66
Percent reduction in groundwater discharge to evapotranspiration:							
• Spring Valley	86%	61%	76%	42%	35%	60%	9%
• Snake Valley	35%	29%	27%	20%	11%	6%	3%
• Great Salt Lake Desert Flow System1	56%	42%	47%	29%	21%	28%	5%

[1]Supporting information used to develop these estimated effects are provided in **Appendices F3.3.6** through **F3.3.16**.

[2]Total located in high or moderate risk areas.

Potential Impacts to Springs and Streams

As described previously, springs that are controlled by discharge from (or hydraulically connected to) the regional groundwater system and located in areas that experience a reduction in groundwater levels would likely experience a reduction in flow.

The number of inventoried springs and miles of perennial stream located within the modeled cumulative drawdown area and located in areas at high or moderate risk are presented in **Figures ES-38** and **ES-39**. These charts show that the number of springs and miles of streams at risk increases over time for all of the cumulative pumping scenarios. For the No Action Alternative at the full build out for both full build out plus 75 years and full build out plus 200 years timeframes, there are 19 and 28 inventoried springs located in areas where impacts to perennial water could occur. Because the No Action Alternative cumulative pumping scenario is a component of the other alternative pumping scenarios, the total number of springs and miles of perennial stream identified for the No Action Alternative is included in the other 6 alternatives (i.e. Proposed Action and Alternatives A through E).

The simulated drawdown for the two alternatives with the largest groundwater withdrawal rate (Proposed Action and Alternative B) could impact flows in the largest number of springs and greatest number of miles of perennial stream reach. The reduced drawdown areas resulting from the Alternative A cumulative pumping scenario could reduce the number of springs and miles of streams impacted. The Alternative C, D, and E cumulative alternatives would further reduce the drawdown area compared to Alternative A, and would potentially impact the fewest number of inventoried springs and fewer miles of perennial stream reach.

Model-simulated Spring and Stream Discharge Estimates

The groundwater flow model was used to simulate changes in flow for selected springs and streams for each of the cumulative pumping scenarios. The selected springs and streams simulated with the model included major groundwater discharge areas located within the White River Valley, Pahranagat Valley, Muddy River Springs Area, Panaca Valley and Snake Valley discussed below.

The White River Valley is located in the upper portion of the White River Flow System flow system and is characterized by numerous perennial surface-water features, which include approximately 13 major spring discharge areas. Example results for two major spring discharge areas located in White River Valley are presented in **Figure ES-40**. Preston Big Springs is located in the northern portion of White River Valley, and Butterfield Springs is located near the eastern edge of the valley floor.

The model simulations indicate that the flow at Preston Big Springs would be reduced by up to 7 percent from groundwater withdrawals included in the No Action Alternative cumulative pumping scenario. Additional reductions in flow resulting from the pumping included in the groundwater development alternatives would be negligible. The model-simulated flow changes at Cold Spring and Nicolas Spring, located in the same general area, show essentially the same results.

Butterfield Springs is located near the eastern edge of the valley floor in the southern portion of White River Valley. The model results indicate that the No Action cumulative pumping scenario would result in a small reduction in flow (up to 3 percent) over the model-simulation period (**Figure ES-40**). The model simulations indicate that all of the groundwater development alternatives would result in reduced flow at these springs. These potential flow reductions result from pumping in Cave Valley. The maximum pumping rate in Cave Valley would occur under the Proposed Action and Alternative B, and the greatest flow reduction at these springs would occur under Alternative B. The model simulations indicate that distributed pumping from the Proposed Action would substantially reduce the potential flow reduction in these springs compared to Alternative B. The reduced pumping in Cave Valley under Alternatives A, C, D and E pumping scenarios is anticipated to also lessen the effects to flows at these springs.

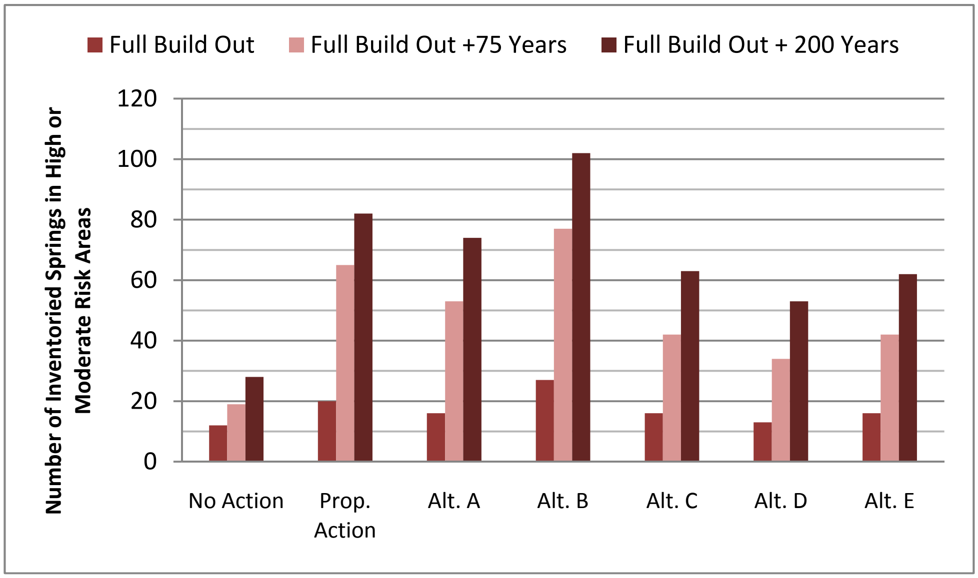


Figure ES-38 Number of Inventoried Springs Located within the Cumulative Drawdown Area and Areas Where Impacts to Flow Could Occur

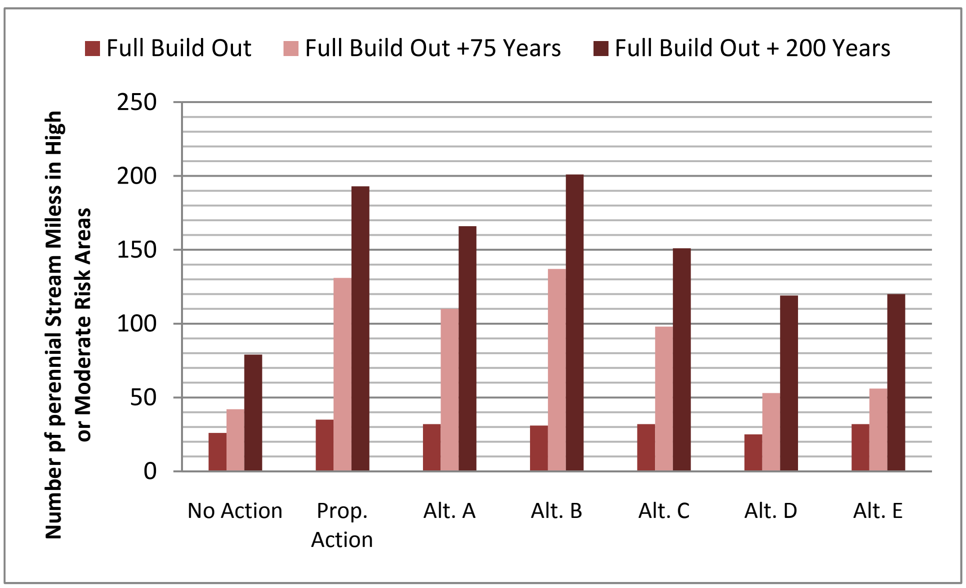
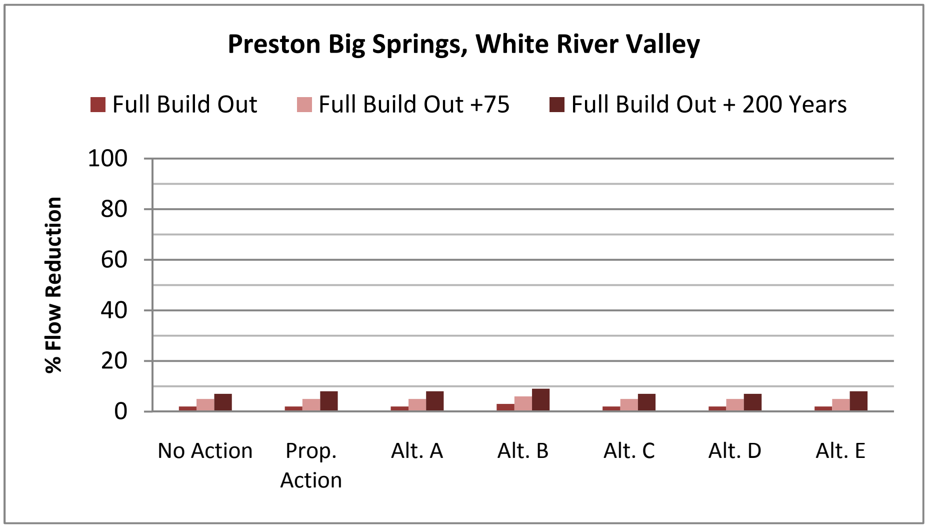


Figure ES-39 Miles of Perennial Stream Located within the Cumulative Drawdown Area and Areas Where Impacts to Flow Could Occur



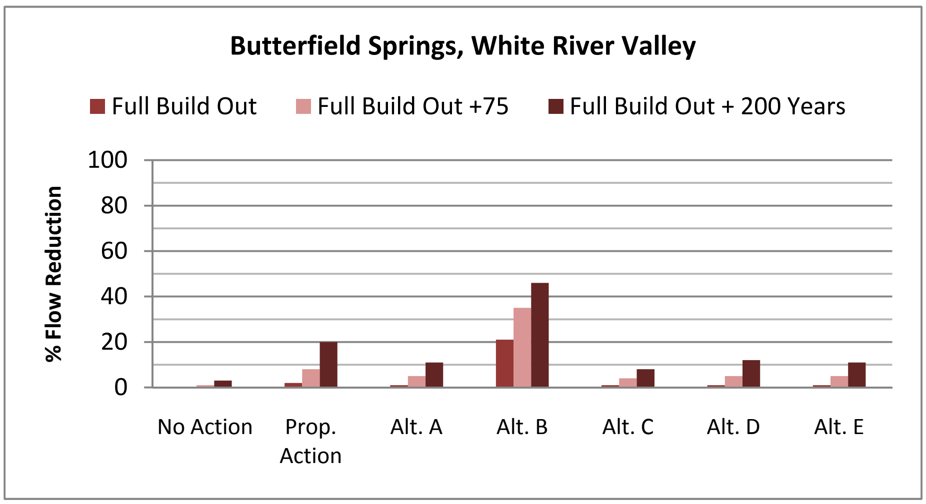


Figure ES-40 Model Simulated Cumulative Reduction in Flows at Preston Big Spring and Butterfield Springs, White River Valley

Pahranagat Valley is located near the middle of the White River flow system. Major surface-water resources in Pahranagat Valley include groundwater discharge at Hiko, Crystal, and Ash springs, along with Brownie Spring, and other smaller springs and seeps in the southern portion of the discharge area. Discharge from the springs supports perennial flows and riparian vegetation along Pahranagat Wash in the Pahranagat hydrographic basin. The regional springs that discharge in Pahranagat Valley (i.e. Hiko, Crystal and Ash Springs) are predicted to experience small flow reductions (up to 4 percent) under the No Action Alternative scenario. These simulated flow changes are essentially the same for all of the scenarios indicating that additional reductions in flow resulting from the GWD Project would be negligible for all alternatives.

Muddy River Springs near Moapa is the headwaters for Muddy River and represents the largest groundwater discharge at the lower end of the White River flow system. The model simulations indicate that groundwater withdrawal included in the No Action cumulative pumping scenario would eventually result in up to a 61 percent reduction in flow at the Muddy River Springs (**Figure ES-41**). Note that the numerical model simulations do not account for the existing Muddy River Memorandum of Agreement regarding groundwater withdrawal in Coyote Spring Valley and California Wash basins, among the SNWA, Moapa Valley Water District, Coyote Springs Investment, Moapa Band of Paiutes, and the U.S. Fish and Wildlife Service, which includes minimum in-stream flow levels. Most of the reduction in flow can be attributed to the pumping included under reasonably foreseeable future actions in the region. These flow changes are essentially the same for all of the groundwater development cumulative pumping scenarios, indicating negligible further reductions in flow from the project for all alternatives.

Panaca Spring is a major spring located in Panaca Valley in the Meadow Valley Flow System. The model simulations results indicate that flow at Panaca Spring located in Panaca Valley would experience flow reductions from pumping under the No Action Alternative cumulative pumping scenario, but the groundwater development pumping (under the Proposed Action and Alternatives A through E) would not contribute to these reductions.

Big Springs is the largest spring located in southern Snake Valley and is located in relative close proximity to the groundwater development area within Snake Valley. For Big Springs, the model simulations indicate that flow reductions for the No Action Alternative cumulative scenario are similar to those in the No Action Alternative scenario. All of the groundwater development alternatives are expected to result in substantial reduction in flow (or potentially eliminate discharge) at Big Springs (**Figure ES-42**). Reductions of flow at Big Springs would reduce flows in Big Springs Creek, and reduce flows to Lake Creek and into Pruess Lake. These results suggest that the springs located on the valley flow in the southern portion of the valley likely would experience a reduction in flow. The simulations indicate that none of the cumulative pumping scenarios would reduce flows in the three other springs located in the central portion of Snake Valley (Foote Reservoir Spring, Kell Spring and Warm Creek near Gandy).

Potential Impacts to Water Rights

The number of surface water rights located in areas where impacts to surface water resources could occur and the number of groundwater rights in the areas where the simulations predict drawdown of 10 feet or more are listed in **Table ES-12**. There are a large number of existing surface water rights located in areas where impacts from drawdown could occur under both the No Action Alternative and groundwater development cumulative pumping scenarios. The model indicates that drawdown for the two alternatives with the greatest groundwater withdrawal rate (Proposed Action and Alternative B) could potentially impact the highest number of water rights. The reduced drawdown areas resulting from the other alternatives (Alternatives A through E) would decrease the number of water rights impacted. Potential impacts to individual water rights are the same as previously summarized.

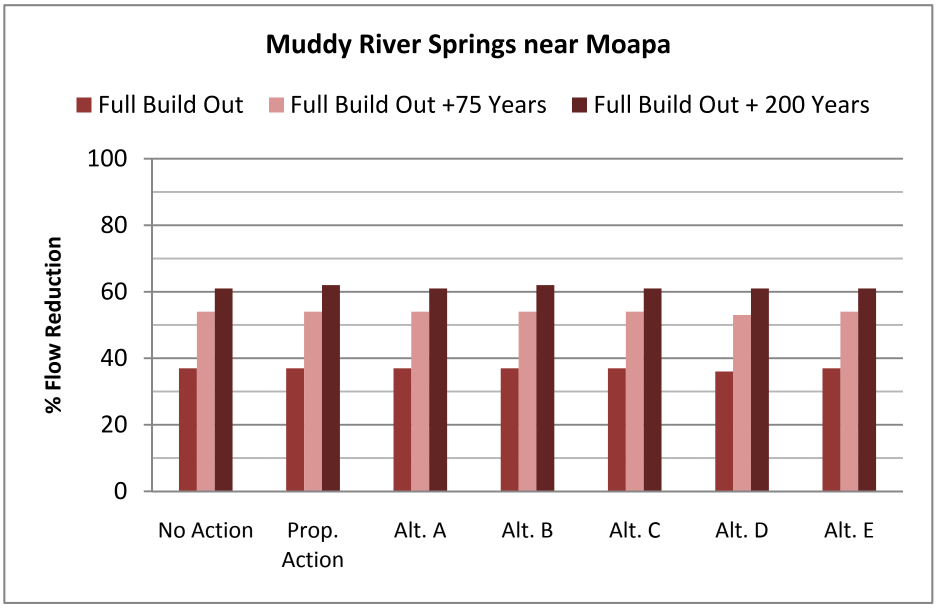


Figure ES-41 Model Simulated Cumulative Reduction in Flows at Muddy River Springs near Moapa.

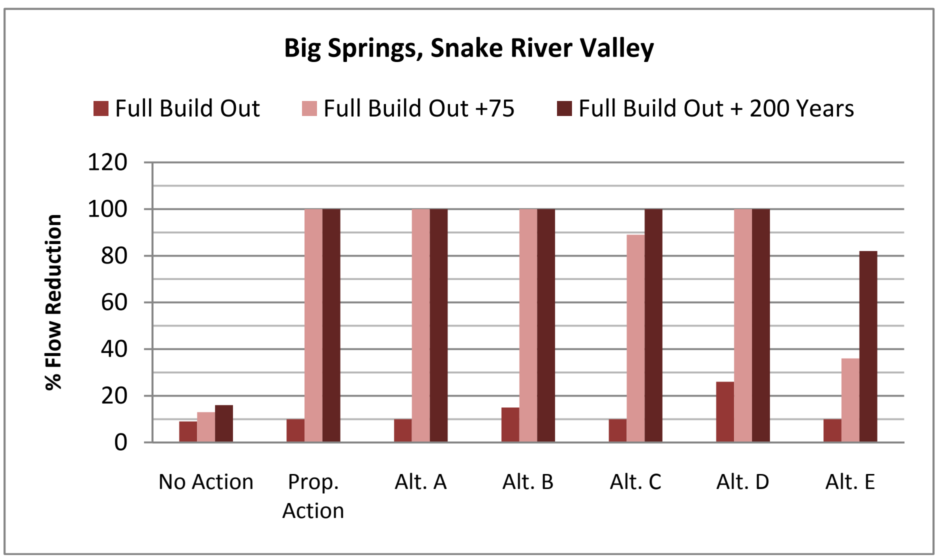


Figure ES-42 Model Simulated Cumulative Reduction in Flows at Big Springs, Snake Valley

Potential Reduction in Groundwater Discharge to Evapotranspiration Areas

Potential changes in the water balance for the groundwater system in the study area were estimated using the groundwater flow model (SNWA 2010b). The estimated reductions in groundwater discharge to evapotranspiration areas for selected basins and flow systems are summarized in **Table ES-9** and illustrated in **Figure ES-43**. The model indicates that groundwater withdrawal included in the No Action Alternative cumulative pumping scenario would have a small effect on the groundwater discharge to evapotranspiration areas in the Great Salt Lake Desert Flow System. For Spring Valley, the No Action Alternative pumping is estimated to result in a 6 and 9 percent reduction of groundwater discharge for evapotranspiration at the full build out plus 75 years, and full build out plus 200 years time frames, respectively. In Snake Valley, pumping is expected to result in minimal reductions (<4 percent) of groundwater discharge to support evapotranspiration.

The Proposed Action would result in the largest reductions in groundwater discharge to evapotranspiration areas within Spring and Snake Valleys; with estimated reductions of up to 86 percent in Spring Valley, and up to 35 percent in Snake Valley. For Snake valley, most of the reductions would occur in the south portion of the valley. The model indicates that Alternative D would have the least impact to evapotranspiration areas in Spring Valley because pumping is concentrated in the south end of the valley away from much of the evapotranspiration areas. The concentrated pumping under Alternative D results in the deepest drawdown cone indicating that a higher percentage of the groundwater withdrawn under this scenario is from storage compared to the other groundwater development alternatives. Alternative E would result in the least impacts to evapotranspiration areas in Snake Valley.

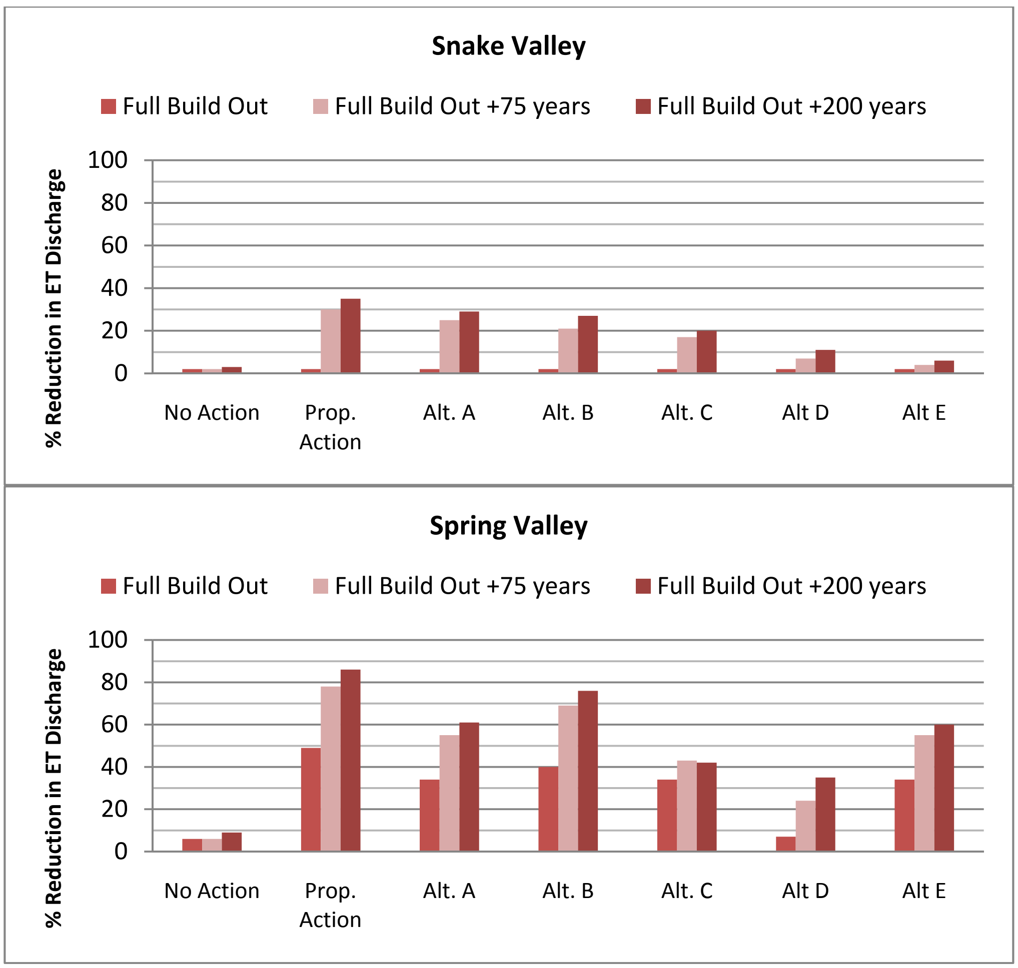


Figure ES-43 Model Simulated Cumulative Reductions in Groundwater Discharge to Evapotranspiration Areas in Spring and Snake Valleys

Other Resources

The cumulative effects of groundwater pumping on other resources are summarized in **Table ES-13**. Cumulative effects on resources from the action alternatives and No Action are presented using key impact indicators. The table provides the following information:

- Results are presented for the full build out plus 75 years time frame. The main body of the EIS provides additional results for two additional time frames (i.e., full build out and full build out plus 200 years).

- For comparison, the table provides both the estimated incremental and cumulative effects associated with each specific pumping alternative. The estimated incremental effects represent those effects that are directly attributable to the specific pumping alternative. The cumulative effects include the combined effects resulting from the total pumping included in:

  (1) The No Action pumping scenario (i.e., continuation of existing pumping into the future);

  (2) Reasonably foreseeable future pumping (i.e., estimated additional pumping that may occur in the future from other projects in the region); and

  (3) Pumping attributable to the specific pumping alternatives.

- The incremental contribution of each alternative to the cumulative effects can be estimated by comparing the impact indicator information for the incremental and cumulative effects under each alternative. The difference between the incremental effects and the overall cumulative effects for a specific alternative is assumed to be the result of the additional pumping included under No Action and reasonably foreseeable groundwater development projects included in the cumulative pumping scenarios.

- The cumulative impact patterns for water dependent resources closely follow the patterns and interactions identified for water resources. In general, the GWD Project would be the dominant contributor of cumulative effects in the hydrographic basins where project well development would occur.

Table ES-13 Summary of Resource Impact Parameters for Individual Alternatives and Cumulative Pumping - Full Build Out Plus 75 Years

Resource	Impact Parameter	Proposed Action	Cumulative with Proposed Action	Alternative A	Cumulative with Alt. A	Alternative B	Cumulative with Alt. B	Alternative C	Cumulative with Alt. C	Alternative D	Cumulative with Alt. D	Alternative E	Cumulative with Alt. E	No Action	Cumulative with No Action
Air	PM_{10} emissions (tons/yr) from windblown dust	24,122	33,152	17,198	26,682	13,743	23,285	6,158	15,501	1,991	11,306	10,470	19,776	4,757	8,225
Geology	Square miles of area with potential ground surface subsidence of > 5 feet.	147	157	5	5	172	197	<1	<1	139	144	5	5	0	0
Water	Number of inventoried springs with moderate or high risk of flow reductions	44	65	29	53	54	77	19	42	13	34	19	42	12	19
	Miles of perennial streams with moderate or high risk of flow reductions	80	131	58	110	91	137	37	98	4	53	7	56	19	42
	Number of surface water rights in drawdown area with moderate or high risks of flow reductions	145	305	109	274	141	299	78	257	23	198	60	224	105	159
Soils	Acres of hydric soils within drawdown area	13,143	26,936	7,374	19,839	6,817	18,022	2,626	16,110	1,143	12,712	5,586	17,854	261	8,798
Vegetation	Wetland/meadows with composition/growth effects (acres)	5,460	7,789	4,624	6,881	5,794	9,008	2,287	4,718	1,507	4,067	2,548	4,805	261	1,840
	Basin shrublands with composition/growth effects (acres)	136,990	187,887	106,414	158,531	97,174	152,528	42,703	96,911	16,747	71,537	71,429	122,805	32,229	47,358
Wildlife	Pumping effects on spring, stream, wetland, and basin shrubland habitats	Wildlife habitats may be modified by changes in composition of groundwater dependent vegetation, and seasonal availability of surface water. For this alternative, see: • Water – risks to springs and streams; • Vegetation – risks to Wetland/ Meadows and Basin Shrublands												No changes in wildlife habitats would occur because no groundwater pumping would occur in project hydrographic basins.	

Table ES-13 Summary of Resource Impact Parameters for Individual Alternatives and Cumulative Pumping - Full Build Out Plus 75 Years (Continued)

Resource	Impact Parameter	Proposed Action	Cumulative with Proposed Action	Alternative A	Cumulative with Alt. A	Alternative B	Cumulative with Alt. B	Alternative C	Cumulative with Alt. C	Alternative D	Cumulative with Alt. D	Alternative E	Cumulative with Alt. E	No Action	Cumulative with No Action
Aquatic Biological Resources	Miles of perennial streams with game fish and special status species with moderate or high risks of flow reductions	60	92	45	77	59	89	29	77	3	34	5	37	6	51
	Number of springs with game fish and special status species with moderate or high risk of flow reductions	10	22	8	18	10	25	8	14	3	11	5	13	4	5
Land Use	Acres of private agricultural land in the drawdown area	15,792	32,183	14,605	31,220	13,865	30,449	12,359	29,891	7,320	19,228	3,635	20,178	14,204	20,058
Rangeland	Number of perennial springs in grazing allotments with risk of flow reductions	210	297	118	227	156	243	63	161	41	127	55	167	46	78
	Perennial stream miles within grazing allotments with risk of flow reductions	73	119	52	99	78	119	37	89	5	48	6	51	19	37
Wild Horses	Number of perennial springs in HMAs with risk of flow reductions	2	28	2	12	2	28	2	28	7	31	2	28	19	26
	Acres of basin shrublands and wet meadows in HMAs and drawdown areas	0	0	0	0	0	0	0	0	0	0	0	0	2,511	2,664
Recreation	Number of springs in recreation areas with risks of flow reductions	20	44	13	39	40	64	3	35	0	23	5	30	14	24
	Miles of game fish streams in recreation areas with risks of flow reductions	8	23	6	20	17	31	1	18	0	10	0	13	<1	16

Table ES-13 Summary of Resource Impact Parameters for Individual Alternatives and Cumulative Pumping - Full Build Out Plus 75 Years (Continued)

Resource	Impact Parameter	Proposed Action	Cumulative with Proposed Action	Alternative A	Cumulative with Alt. A	Alternative B	Cumulative with Alt. B	Alternative C	Cumulative with Alt. C	Alternative D	Cumulative with Alt. D	Alternative E	Cumulative with Alt. E	No Action	Cumulative with No Action
Special Designations	Acres of wetland/meadow and basin shrubland vegetation in special designations and drawdown area	13,729	13,729	11,222	11,744	13,534	14,142	4,912	5,743	8,262	9,377	11,222	11,744	0	488
Visual Resources	Gradual changes in landscape views of wetland/meadows (acres)	5,460	7,789	4,624	6,881	5,794	9,008	2,287	4,718	1,507	4,067	2,548	4,805	261	1,840
	Gradual changes in landscape views of basin shrublands	136,990	187,887	106,414	158,531	97,174	152,528	42,703	96,911	16,747	71,537	71,429	122,805	32,229	47,358
Native Americans Tradition Values	Drawdown effects on water and vegetation aquatic biological and wildlife resources	The location and availability of plants used for food and traditional uses, fishery quality, and flows of streams and springs may be modified by groundwater pumping. For this alternative, see: • Water – risks to springs and streams; • Aquatic Biology – risks to game fish and special status species. Vegetation – risks to Wetland/ Meadows and Basin Shrublands												No changes in the availability of plants used for food and traditional uses, and flows in springs and streams because no groundwater pumping would occur in project hydrographic basins.	
Socioeconomics	Acres of agricultural land potentially affected by drawdown of ≥10 feet	15,792		14,605		13,865		12,359		7,320		3,635		14,204	
	Acres of public lands identified for potential disposal with drawdown risks ≥10 feet	4,926		4,926		4,926		4,926		0		107		29,612	

What is the Agency Preferred Alternative?

BLM has not identified an agency preferred alternative for this draft EIS.

Under the BLM's NEPA regulations (43 C.F.R. § 46.420(d)), the BLM's "preferred alternative" is the alternative which the BLM believes would best accomplish the purpose and need of the proposed action while fulfilling its statutory mission and responsibilities, giving consideration to social, cultural, environmental, technical, economic and other factors. Those regulations only require the draft EIS to include a preferred alternative if one or more exists. This is consistent with the Council on Environmental Quality regulations and guidance. In a draft EIS on an agency action, typically the preferred alternative would be the agency's proposed action. Here, the proposed action that is the subject of this draft EIS concerns whether to grant an application for a ROW to a non-federal entity, the Southern Nevada Water Authority. For the reasons stated below, the BLM has not identified an agency preferred alternative at this draft EIS stage. The BLM may decide at the final EIS stage, based on the draft EIS, and the public and agency comments, that an alternative other than the proposed action is the agency's preferred alternative.

As discussed in this draft EIS, the proposed action concerns whether the BLM should grant a ROW to the SNWA to construct a pipeline to convey water, primarily from wells to be located in the five hydrologic basins. This draft EIS analyzes the site specific impacts of the construction and operation of the proposed water conveyance pipeline and it associated facilities (Tier 1). Specific plans and the quantities of the water to be conveyed in the pipeline system are unknown and will be the subject of subsequent NEPA analysis (Tier 2) when plans are submitted by the SNWA to the BLM in the future for development in the five basins.

The predominant source of water for the pipeline is groundwater that is subject to the jurisdiction of the Nevada State Engineer. The Nevada State Engineer has yet to act on the SNWA's water right applications, thus, the actual quantity of water that may be pumped from any of the five basins is unknown and therefore, will be the subject of future NEPA analysis (Tier 2) as specific plans are submitted to the BLM. In addition, there is, in general, a limited amount of information on the groundwater system in the five basins and in particular in the Snake Valley area of the project, as well as, disagreement on how best to technically interpret various hydrologic and scientific studies. Thus, the BLM has chosen to not select a preferred alternative until after the public has had a chance to review and comment on the draft EIS.

Even though the BLM is not selecting a preferred alternative at this time, it has identified—consistent with its environmental review and ROW permitting responsibilities, and recognizing the Nevada State Engineer's jurisdiction over the SNWA's groundwater applications—that Alternative A (including the mitigation and monitoring identified in Chapter 3 of the draft EIS) may be considered as a reasonable scenario for the proposed water conveyance pipeline and the related groundwater rights process before the Nevada State Engineer. The BLM asks the reader to use Alternative A as a starting point in reviewing the draft EIS. The groundwater withdrawal amounts in Alternative A are based on the amounts previously approved by the Nevada State Engineer for Cave, Delamar, Dry Lake, and Spring valleys, which approvals were subsequently set aside by the Nevada Supreme Court in June 2010, and the estimated amount for Snake Valley from prior discussions between the States of Nevada and Utah concerning potential groundwater availability from that valley. As noted previously, the BLM's role as a federal land manager considering the SNWA's ROW applications is separate from the Nevada State Engineer water rights process. Only the Nevada State Engineer has the jurisdiction to grant or deny the SNWA's pending groundwater applications.

The draft EIS also proposes four specific alignment options for the proposed action (water conveyance pipeline system and associated facilities) which are under consideration and which the BLM may include as part of the preferred alternative in the final EIS. The BLM specifically requests the public to comment on these options.

Due to the controversial nature of this project, the BLM is particularly interested in seeing comments and suggestions for the analysis of the Snake Valley portion of the proposed project and identification of impacts to resources in the area, especially to those in Great Basin National Park. Concern has been voiced by the National Park Service, the U.S. Fish and Wildlife Service, local counties, and others about the potential for impacts to water-dependent resources of interest from the proposed groundwater withdrawals associated with this project.

Acronyms and Abbreviations

°C	Degrees Celsius
°F	Degrees Fahrenheit
µg/m^3	micrograms per cubic meter
µS/cm	microSiemens per centimeter
3M Plan	Monitoring, Mitigation, Management Plan
AADT	Annual Average Daily Traffic
AAQS	Ambient Air Quality Standard
AC	alternating current
ACEC	Area of Critical Environmental Concern
ACHP	Advisory Council on Historic Preservation
ACM	Applicant-committed Protection Measure
AFB	Air Force Base
afy	acre-feet per year
AGI	American Geological Institute
AIRFA	American Indian Religious Freedom Act
AML	appropriate management level
amsl	above mean sea level
APE	area of potential effects
APLIC	Avian Power Line Interaction Committee
ARPA	Archaeological Resources Protection Act
ATV	all terrain vehicle
AUM	animal unit months
BARCAS	Basin and Range Carbonate-Rock Aquifer System
BIA	Bureau of Indian Affairs
BLM	Bureau of Land Management
BMP	Best Management Practices
CAA	Clean Air Act
CBER	Center for Business and Economic Research
CCRP	Central Carbonate-rock Province
CDE	carbon dioxide-equivalent
CEQ	Council on Environmental Quality
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Register
cfs	cubic feet per second

CO	carbon monoxide
CO_2	carbon dioxide
CWA	Clean Water Act
ð^{18}O	Oxygen 18
dB	decibels
DCNR	Department of Conservation and Natural Resources
DDC	Dry Lake, Delamar, and Cave Valleys
DOE	Department of Energy
DOI	Department of the Interior
DRI	Desert Research Institute
EIS	Environmental Impact Statement
EMS	Emergency Medical Services
ENWU	Eastern Nevada-Western Utah
EO	Executive Order
EPCRA	Emergency Planning and Community Right-to-know Act
ESA	Endangered Species Act
ET	evapotranspiration
FEIS	Final Environmental Impact Statement
FEMA	Federal Emergency Management Agency
FERC	Federal Energy Regulatory Commission
FLM	Federal Land Manager
FLPMA	Federal Land Policy and Management Act of 1976
FONSI	Finding of No Significant Impact
g	9.80 meters per second squared
GBBO	Great Basin Bird Observatory
GBNP	Great Basin National Park
GID	General Improvement District
GIS	Geographic Information System
GPCD	gallons per capita per day
gpm	gallons per minute
GPS	Global Positioning System
GWD Project	SNWA’s Clark, Lincoln, and White Pine Counties Groundwater Development Project
HA	Hydrologic Area
HB	Hydrologic Basin
HFB	hydraulic flow barrier

HGU	hydrogeologic units
HMA	herd management area
IPCC	Intergovernmental Panel on Climate Change
ISA	Instant Study Area
KOP	key observation points
kV	kilovolts
LCCRDA	Lincoln County Conservation, Recreation, and Development Act
LCRMSCP	Lower Colorado River Multiple Species Conservation Program
LCWD	Lincoln County Water District
LVCVA	Las Vegas Convention and Visitors Authority
LVVWD	Las Vegas Valley Water District
m	meter
MBTA	Migratory Bird Treaty Act
MCL	Maximum Contaminant Level
mgd	million gallons per day
MLRA	Major Land Resource Areas
Mn^{-1}	inverse megameters
MOA	Memorandum of Agreement
MOU	Memorandum of Understanding
mph	mile per hour
MW	megawatt
NAAQS	National Ambient Air Quality Standard
NAC	Nevada Administrative Code
NAGPRA	Native American Grave Protection and Repatriation Act of 1990
NDEP	Nevada Division of Environmental Protection
NDOT	Nevada Department of Transportation
NDOW	Nevada Department of Wildlife
NDWR	Nevada Department of Water Resources
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NNHP	Nevada Natural Heritage Program
NO_2	nitrogen dioxide
NOAA	National Oceanographic and Atmospheric Administration
NOI	Notice of Intent
NO_X	Nitrogen oxides
NP	National Park

NPDES	National Pollutant Discharge Elimination System
NPS	National Park Service
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
NRS	Nevada Revised Statute
NSE	Nevada State Engineer
NWR	National Wildlife Refuge
OHV	off-highway vehicle
PA	Programmatic Agreement
PILT	Payment in Lieu of Taxes
PM	Particulate Matter
PM_{10}	particulate matter with an aerodynamic diameter of 10 microns or less
$PM_{2.5}$	particulate matter with an aerodynamic diameter of 2.5 microns or less
POD	Plan of Development
ppm	parts per million
ppmw	parts per million weight
PRISM	Parameter-elevation Regression on Independent Slopes Model
PWR	Public Water Resources
RASA	Regional Aquifer Systems Analysis
RFFA	reasonably foreseeable future actions
RFRA	Religious Freedom Restoration Act
RMP	Resource Management Plan
ROD	Record of Decision
ROW	right-of-way
SH	State Highway
SHPO	State Historic Preservation Officer
SNPLMA	Southern Nevada Public Land Management Act
SNWA	Southern Nevada Water Authority
SO_2	Sulfur dioxide
SR	State Route
SRMA	Special Recreational Management Areas
SRP	Special Recreation Permit
SSURGO	Soil Survey Geographic Database
STATSGO	U.S. General Soil Map
SWReGAP	Southwest Regional Gap Analysis Project
TCP	Traditional Cultural Properties

TCWCP	Tri-County Weed Control Project
TSP	Total Suspended Particulate
TSS	Total Suspended Solids
U.S.	United States
UDWR	Utah Division of Wildlife Resources
UGS	Utah Geological Society
UNLV	University of Nevada, Las Vegas
USACE	U.S. Army Corps of Engineers
USC	United States Code
USDA	U.S. Department of Agriculture
USDOE	United States Department of Energy
USDOT	U.S. Department of Transportation
USEPA	U.S. Environmental Protection Agency
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service
USGCRD	United States Global Change Research Program
USGS	U.S. Geological Survey
UTM	Universal Transverse Mercator
VOC	volatile organic compounds
VQO	Visual Quality Objectives
VRI	Visual Resource Inventory
VRM	Visual Resource Management
WMA	Wildlife Management Area
WSA	Wilderness Study Area